

INDIA

# RUBBER WORLD

NOVEMBER, 1947

UNIFORM • CONSISTENT • DEPENDABLE

# Spheron

CHANNEL BLACK .....

EPC



L. CABOT, INC. BOSTON 10, MASS.

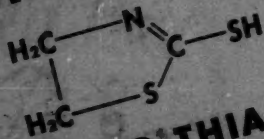


# LOW HEAT BUILD-UP AND MORE TIRE MILEAGE WITH . . .



**DU PONT  
ACCELERATOR**

**2-MT**



**(2-MERCAPTO-THIAZOLINE)**

## ADVANTAGES OF 2-MT OVER THIAZOLES AS SHOWN IN TIRE VULCANIZATES

Rubber stocks accelerated with 2-MT exhibit the following good qualities:

1. Exceptionally low heat build-up.
2. Practically no tendency to revert and exhibit other undesirable effects of long curing.
3. Excellent resistance to heat and aging.
4. Extraordinary retention of tensile strength, extensibility and resistance to tear, at elevated temperatures.
5. Conspicuous resistance to flex cracking.

Data accumulated from laboratory, plant and road tests prove beyond a doubt that the exceptional quality imparted by 2-MT to natural rubber compounds results in vastly improved truck tire performance. The outstanding advantages of 2-MT are the low heat build-up and the remarkable heat and age resistance that it imparts to stocks without resorting to low sulfur ratios. All of these plus values can be translated into higher mileage and longer life for your tires.

Accelerator 2-MT (thiazoline) shows advantages over MBT (thiazole) similar to those which the thiazoles provided over earlier types of accelerators.

The structural formula of 2-MT shown above reveals some relationship to mercapto benzo thiazole, but in its behavior the following favorable differences will be observed:

1. At vulcanizing temperatures below 267°F. its speed and strength are equal but at higher temperatures it is a slightly stronger and faster accelerator.
2. The modulus curve of stocks accelerated with straight 2-MT is slightly steeper. However, when the 2-MT is activated with a

guanidine or an aldehyde amine, the modulus curve is flatter.

3. 2-MT is less acidic than MBT. Consequently it can be activated with guanidines or aldehyde amines with greater safety at processing temperatures.
4. Also because 2-MT is less acidic, the use of Retarder W or other organic acids such as stearic acid has greater retarding effect at processing temperatures. However, at vulcanizing temperatures (above 267°F.) this action is reversed and Retarder W activates acceleration.

Although rubber compounds having the most desirable physical qualities will be obtained by the use of 2-MT without secondary acceleration, activation with a guanidine or with an aldehyde amine such as Accelerator 808 results in faster cures.

**Rubber Chemicals Division**

**E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Del.**

**DU PONT RUBBER CHEMICALS**

BETTER THINGS FOR BETTER LIVING  
... THROUGH CHEMISTRY



# SUPERB OIL RESISTANCE

is only one of Hycar synthetic rubber's unusual and valuable properties. Others are listed in the box at the right.

But most important, these properties may be had in an almost limitless number of combinations, each designed to meet specific service conditions of the finished Hycar part.

Our files contain more than 5000 recipes for Hycar compounds—each compound engineered to do a certain job. Parts made from HY-

CAR have seen service in every industry, giving long life, dependability, and economical operation.

That's why we say, ask your supplier for parts made from Hycar. Test them in your own application, difficult or routine. You'll learn for yourself that it's wise to use HY-CAR for long-time, dependable performance. For more information, please write Department HA-11, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

## Hycar

*American Rubber*

### B. F. Goodrich Chemical Company

A DIVISION OF  
THE B. F. GOODRICH COMPANY

#### CHECK THESE SUPERIOR FEATURES OF HYCAR

1. EXTREME OIL RESISTANCE — insuring dimensional stability of parts.
2. HIGH TEMPERATURE RESISTANCE—up to 250° F. dry heat; up to 300° F. hot oil.
3. ABRASION RESISTANCE—50% greater than natural rubber.
4. MINIMUM COLD FLOW—even at elevated temperatures.
5. LOW TEMPERATURE FLEXIBILITY—down to -85° F.
6. LIGHT WEIGHT—15% to 25% lighter than many other synthetic rubbers.
7. AGE RESISTANCE—exceptionally resistant to checking or cracking from oxidation.
8. HARDNESS RANGE—compounds can be varied from extremely soft to bone hard.
9. NON-ADHERENT TO METAL—compounds will not adhere to metals even after prolonged contact under pressure. (Metal adhesions can be readily obtained when desired.)

This advertisement appeared in a long list of carefully selected business papers TO HELP YOU SELL parts made from HYCAR.



## PHILBLACK-O THROWS ABRASION FOR A LOSS!

Look at that little guy . . . Philblack-O! A triple-threat star . . . a black marvel. One of the rubber industry's selections for All-American!

Watch him . . . **TACKLE** the toughest abrasion jobs . . . **BLOCK** cut and crack growth . . . **PASS** for long gains with good flex life . . . **SCORE** with easy processing . . . **KICK** that extra point with low heat build-up.

Send for a trial order today. Give him a position in your rubber products and make him the star in your line-up.

### PHILLIPS PETROLEUM COMPANY

*Philblack*  *Division*

EVANS SAVINGS AND LOAN BUILDING • AKRON 8, OHIO

# protection is our business

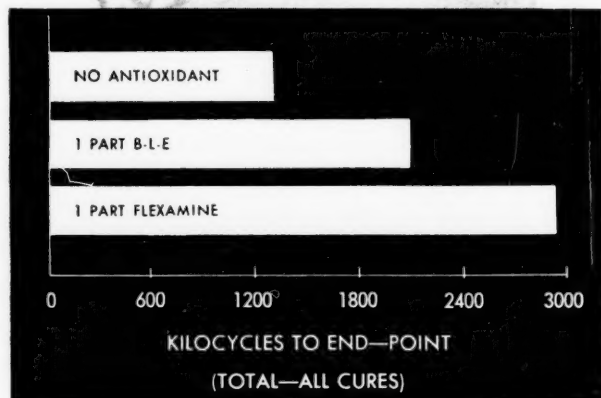
NATURAL RUBBER TREADS — SOLES  
BELTS — CABLE JACKETS  
— MECHANICALS NEED THE  
BEST AVAILABLE PROTECTION  
AGAINST FLEX-CRACKING  
AND AGING.

## NAUGATUCK FLEXAMINE PROTECTS

The advantages of FLEXAMINE over

the best standard antioxidant  
are demonstrated by the  
accompanying diagram of results  
of flexing a natural rubber tread stock  
at the rate of 24KC per hour at 75 per cent  
extension to a predetermined end point.

write for special  
Flexamine Bulletin



process — accelerate — protect with **naugatuck chemicals**

NAUGATUCK  CHEMICAL

*Division of United States Rubber Company*

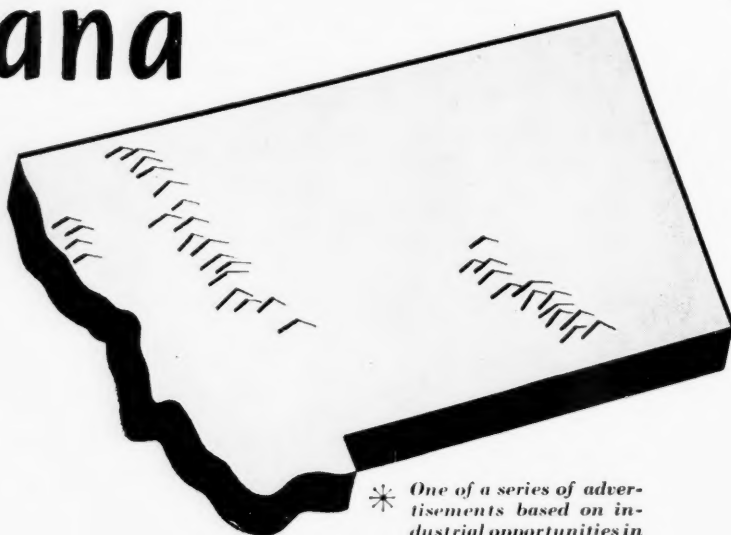
1230 AVENUE OF THE AMERICAS • NEW YORK 20, N. Y.

IN CANADA: Naugatuck Chemicals Division, Dominion Rubber Co., Elmira, Ont.



# Montana\*

**WEALTH OF MINERAL DEPOSITS  
IMMENSE COAL RESERVES  
LARGE LUMBER PRODUCTION  
AVAILABLE WATER POWER  
ABUNDANT LIVESTOCK  
VALUABLE WOOL CLIP  
VARIED AGRICULTURE  
TREMENDOUS WHEAT YIELD  
SCENIC BEAUTY**



\* One of a series of advertisements based on industrial opportunities in the states served by the Union Pacific Railroad.

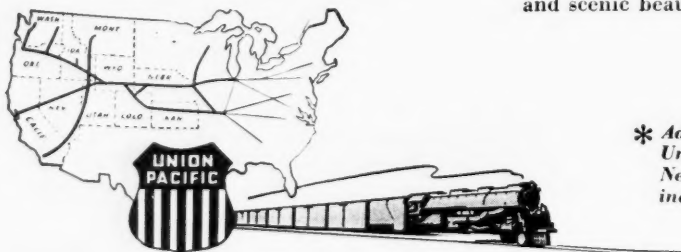
**K**nown as the "Treasure State," Montana is richly endowed with raw materials essential to industrial production. Among the many metallic minerals are silver, copper, lead, manganese, chromium and molybdenum. Coal reserves have been estimated at over 400 billion tons. The majority of the state's cities are supplied with natural gas.

Montana is a top producer of cattle and sheep, the annual sheep production being approximately two million head with a wool clip of great value. In agriculture, wheat takes first rank among grains. Sugar

beets, potatoes, together with other vegetables, are grown on its farms. There are many thousand acres of forests, principally pine.

The Union Pacific Railroad serves Butte in the heart of the great mining area, and West Yellowstone—most popular rail entrance to the famous Yellowstone National Park.

Montana welcomes new industry. It has the space, materials, facilities and manpower to encourage firms seeking new locations. Additional advantages are good living conditions, an excellent educational system and scenic beauty.



\* Address Industrial Department, Union Pacific Railroad, Omaha 2, Nebr., for information regarding industrial sites.

## UNION PACIFIC RAILROAD

THE STRATEGIC MIDDLE ROUTE

# Good-rite VULTROL



for use in American rubber compounding  
to prevent scorching, and for recovering  
scorched stocks

GOOD RITE AND VULTROL REG. T. M. U. S. PAT. OFF.

*For technical data please write Dept. CA-11*

**B. F. Goodrich Chemical Company**

A DIVISION OF  
THE B. F. GOODRICH COMPANY

ROSE BUILDING, CLEVELAND 15, OHIO

GEON polyvinyl materials • HYCAR American rubber • KRISTON thermosetting resins • GOOD-RITE chemicals



YOUR TELEPHONE TRANSMITTER AND RECEIVER, voice gateways to the telephone plant, are so essential to satisfactory service that they have been under study in Bell laboratories for seven decades.



**A** TELEPHONE RECEIVER is a complex system of electrical and mechanical elements. Its coils, magnets, diaphragm and cap react on each other as they convert the electrical waves of your voice to sound waves. What is the best size for the holes in the ear cap? Will  $1/1000$ th inch greater thickness help a receiver diaphragm to carry your telephone voice more clearly? One way to find out is to build numerous experimental receivers and test them.

But Bell Laboratories have found a shorter way. They built an all-electrical replica, an "equivalent circuit" in which electrical resistance stands for air friction in the cap

holes; capacitance corresponds inversely to the stiffness of the diaphragm. Over-all performance of this circuit can be quickly measured and design changes economically explored. Later, a model can be built for final check.

The "equivalent circuit" was pioneered by Bell Telephone Laboratories 25 years ago. It is a useful tool in many Laboratories developments—saving time, saving the cost of machine-tooled models, encouraging experimentation. It is one more example of the way Bell scientists get down to fundamentals as telephone progress continues—and service keeps on improving for all subscribers.



**BELL TELEPHONE LABORATORIES**

EXPLORING AND INVENTING, DEVISING AND PERFECTING, FOR CONTINUED IMPROVEMENTS AND ECONOMIES IN TELEPHONE SERVICE

ER,  
en-  
een  
les.



## MONEY SAVING TOOLS

Layouts, drawings, specifications, bills of material. These documents, prepared by Giffels & Vallet, Inc., represent condensed experience gained in more than twenty years of professional engineering practice. They are the plan of attack for building toward lower production costs. They are the tools used to acquire competitive prices on equipment, materials, and construction labor. They represent designs in which the engineering has been integrated so that delays and costly field changes are eliminated. These tools are available to you for the development of your plans for new rubber & plastics plants or for expansion and modernization programs.

### **GIFFELS & VALLET, INC.**

**INDUSTRIAL ENGINEERING DIVISION  
1000 MARQUETTE BUILDING, DETROIT**

This advertisement in The Saturday Evening Post features BARRETT Rubber Compounding Chemicals and shows the vital part played by the rubber industry in raising the American standard of living.

HOW MANY rubber articles in this picture? That's a game you could play almost *anywhere*, for rubber is an ever-present part of our living. To adapt rubber for its varied applications, the rubber industry relies heavily upon chemicals, like CUMAR\* resin, which are supplied by BARRETT.



HOW BARRETT SERVES THE RUBBER INDUSTRY. BARRETT CUMAR\* resin and more than a score of other BARRETT Rubber Compounding Materials are widely used by the rubber industry to impart desired degrees of hardness, softness, elasticity, wear resistance or other characteristics to natural, synthetic and reclaimed rubber. You benefit from their use in automobile tires and tubes, garden hose and rubber footwear, gloves, wire insulation, friction tape, adhesives and hundreds of other items in daily life. Helping American industry in basic ways has made Barrett **ONE OF AMERICA'S GREAT BASIC BUSINESSES.**



**THE BARRETT DIVISION**  
ALLIED CHEMICAL & DYE CORPORATION  
40 RECTOR STREET, NEW YORK 6, N. Y.

#### BARRETT RUBBER COMPOUNDING MATERIALS

CARBONEX\* Rubber Softener and Extender...CARBONEX\*S Rubber Softener and Extender...CUMAR\* Paracoumarone-indene Resin...  
BARDOL\* Rubber Compounding Oil...BARDOL\*B Rubber Compounding Oil...DISPERSING OIL No. 10...B.R.H.\* No. 2 Rubber Reclaiming Oil...  
B.R.S. No. 700 Rubber Softener...B.R.T.\* No. 3 Rubber Reclaiming Oil and Saturant...B.R.T.\* No. 4 Rubber Reclaiming Oil...B.R.T.\*  
No. 7 Rubber Softener...B.R.V.\* Rubber Softener...B.R.C.\* No. 20 Rubber Plasticizer and Extender...RESIN "C"\* Coal-tar Resin...  
DIBUTYL PHTHALATE...PHENOL...CRESYLIC ACID...BENZOL...TOLUOL...AMMONIA.

\*Reg. U. S. Pat. Off.

LD  
play  
ber  
like

SUBJECT: *United Blacks*



RUBBER COMPANY

*MEMO*

from: *Chief Compounder*  
to: *Purchasing Department*  
subject: *United Blacks*

*Our problems will be  
solved once we standardize  
on United Blacks*

UNITED CARBON COMPANY, INC.

CHARLESTON 27, W. VA.

NEW YORK • AKRON • CHICAGO • BOSTON

# SUBJECT: *United Blacks*



United blacks are known round the world for dependable quality and satisfactory performance.

United's mastery of channel and furnace black manufacture has created in their blacks that fine balancing of properties so conducive to good processing and sturdy wear.

United blacks are scientifically controlled, and therefore score high for uniformity.

United blacks meet all your specifications all the time.

Reach a high standard in your goods by standardizing on United blacks.

RESEARCH DIVISION

**UNITED CARBON COMPANY, INC.**

Charleston 27, West Virginia

CHEMICALS

GENERAL CHEMICAL  
COMPANY

## GEARED TO THE NEEDS OF INDUSTRY

PAPER

METALS

RUBBER

LEATHER

TEXTILES

when it's basic chemicals

...call on GENERAL CHEMICAL *first!*

PETROLEUM

SOAP

GLASS  
&  
CERAMICS

DRUGS

The General Chemical Company Sales and Technical Service organization works shoulder to shoulder with Industry . . . constantly alert to changing chemical demands in every field. Closely coordinated with it are the Company's progressive research program, and extensive—yet extremely adaptable—production facilities.

This way, General Chemical products are always geared to the needs of Industry . . . their grades and strengths meeting the most exacting requirements of the day. From such closely meshed efforts are coming General Chemical's new organic and inorganic chemicals for the process industries of tomorrow. The past stands proof that these, too, will be equally essential "Basic Chemicals for American Industry."

### GENERAL CHEMICAL COMPANY

40 Rector Street, New York 6, N. Y.

*Sales and Technical Service Offices:* Albany • Atlanta • Baltimore • Birmingham  
Boston • Bridgeport • Buffalo • Charlotte • Chicago • Cleveland • Denver  
Detroit • Houston • Kansas City • Los Angeles • Minneapolis • New York  
Philadelphia • Pittsburgh • Portland (Ore.) • Providence • San Francisco  
Seattle • St. Louis • Wenatchee • Yakima (Wash.)

In Wisconsin: General Chemical Wisconsin Corporation, Milwaukee, Wis.

In Canada: The Nichols Chemical Company, Limited • Montreal • Toronto • Vancouver

BASIC CHEMICALS



FOR AMERICAN INDUSTRY



**Biggs**  
**VULCANIZERS and**  
**DEVULCANIZERS**  
 Have Served the  
 Rubber Industry for  
 More Than 45  
 Years



Fig. 3—vertical vulcanizer with quick-opening door. Door is handled by self-contained arm and gear-operating mechanism. Hand or motor operation.

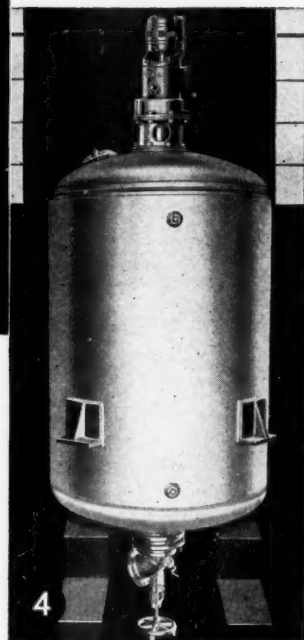
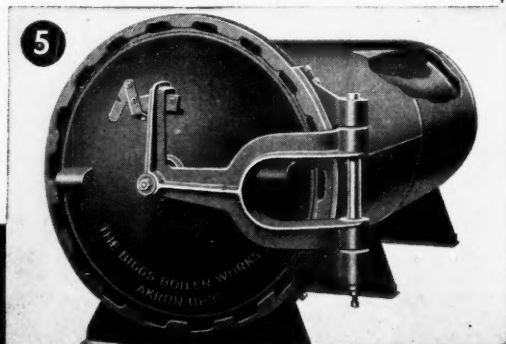


Fig. 4—high pressure heavy duty jacketed vertical devulcanizer with special agitator. Furnished in various sizes.

Fig. 5—horizontal steam-jacketed vulcanizer with hinge type quick-opening door; all sizes, for various working pressures. Welded construction throughout.









**B**IGGS-built vulcanizers and devulcanizers have occupied a prominent place in the development of the rubber industry since its inception. For more than 45 years Biggs has furnished single-shell and jacketed vulcanizers both vertical and horizontal, as well as many different types of devulcanizers to meet various requirements of the reclaim experts. . . . It is a far cry from the old days of bolted doors and riveted construction to Biggs modern all-welded units with quick-opening doors. Biggs vulcanizers and devulcanizers are available in all sizes and for various working pressures — with numerous special features. Write now for our Bulletin 45.

**BIGGS WELD**  
 EST. 1887  
**THE Biggs BOILER WORKS CO.**  
 1007 BANK STREET, AKRON 5, OHIO, U.S.A.

# today...as always...

## YOU GET ALL THESE ADVANTAGES WITH

### *Buffalo Reclaims*

-  *They are stable in price*
-  *Freight paid to your plant*
-  *They fill most compounding needs—for natural or synthetic—separately or in combination*
-  *Available on short notice*
-  *Uniform—due to scientifically controlled manufacture*
-  *Cut costs in processing because they require less mixing time and consume less power in most compounding—a very important economy in this period of high labor charges*

**U. S. RUBBER RECLAIMING COMPANY, INC.**  
500 FIFTH AVENUE • NEW YORK 18, N. Y. • (Plant at Buffalo, N. Y.)

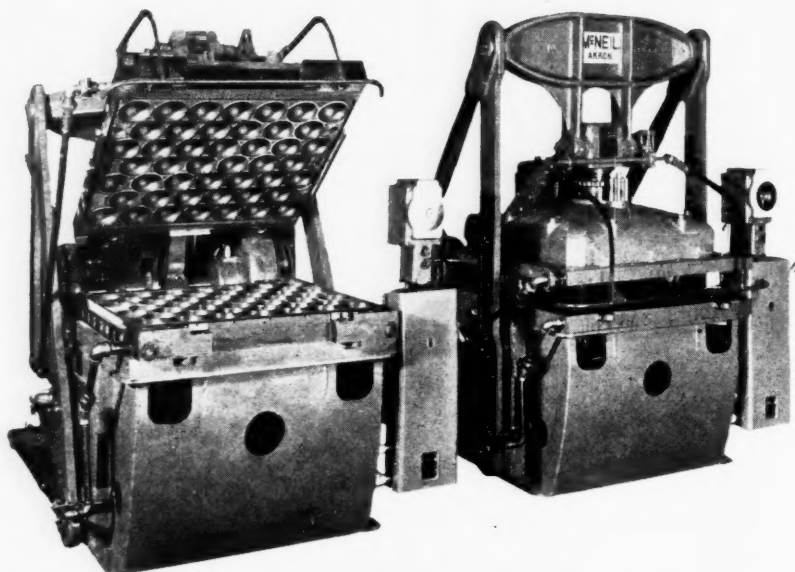
TRENTON ... H. M. ROYAL, Inc., 689 Pennington Avenue

*65 Years Serving the Industry Solely as Reclaimers*

# MODERN PRESSES . . .

## McNEIL PLATEN PRESSES FOR BLOWN GOODS OR SPONGE

**Motor operated—No hydraulic. Made in 40" x 40" square platens, or if circular platens are desired, can be furnished in two sizes, 42" for 110,000# total load or 52" for 200,000# total load.**



**Two 40" x 40" platen presses good for 110,000# total load. This is an ideal type of press for zero pressure tires, play balls, hollow rubber toys or sponge rubber products.**

*All the experience and engineering skill of the McNEIL organization is at your call to help you increase efficiency and speed while lowering production costs. For tomorrow's production, check with McNEIL today.*

*We also make a Heavy Duty Line of Mechanical Goods Presses*

Sales Agent—Eastern States  
B. H. DAVIS  
928 Glenview Rd., Ridgewood, N. J.

MANUFACTURING AGENTS  
GREAT BRITAIN—Francis Shaw & Co., Ltd., Manchester, England  
AUSTRALIA and NEW ZEALAND—Chas. Ruwolt Proprietary, Ltd., Victoria, Australia.

**McNEIL**  
AKRON

**The McNEIL Machine & Engineering Co.**  
96 East Crosier St. Akron 11, Ohio

RUBBER WORKING MACHINERY • INDIVIDUAL CURING EQUIPMENT FOR TIRES, TUBES and MECHANICAL GOODS

# What about PHENOLIC RESINS for compounding **HARD** and **SEMI-HARD** stocks?

## DUREZ RESINS

*in the  
Rubber  
Industry*

Durez phenolic resins have two basic major uses in the rubber industry: for compounded stocks and solvent-type adhesives. This bulletin contains a brief, simple outline of these uses and of the various Durez resins which are available today. There is, of course, constant advancement in both resin and synthetic rubber and synthetic rubbers. It therefore may be readily assumed that the present applications will expand.

Compounding of hard and semi-hard rubber stocks accounts for the greatest use of Durez resins in the rubber field. These resins are useful with acrylonitrile-butadiene (Graft A or GFA type) styrene-butadiene (Graft A or GFA type) and other types of rubber stocks.

Excellent solvent-type adhesives are provided using Durez resins with Graft A, natural rubber, and Neoprene. Durez resins have been successfully used as an adhesive for bonding uncured and cured Graft A stock to various materials during the molding operation.

Another recent and interesting use is one in which Durez resins have provided considerably increased adhesion between rubber and fabric where they have been used in the preparation of skid and traction fabrics. This application is not yet widespread but offers excellent possibilities.

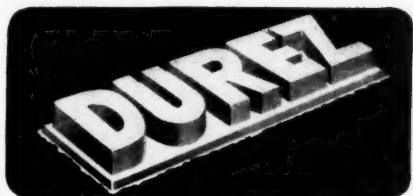


New report shows  
advantages as  
plasticizers...also  
end-product benefits

Recent developments indicate that specially formulated phenolic resins have a wide field of usefulness in processing rubber stocks. In all cases they serve as very effective plasticizers. They also contribute to such physical properties of the final stock as reinforcement, hardness, stiffness, abrasion resistance, and heat and chemical resistance, and they improve finish. Conclusions based on recent studies in this field are presented in "Durez Resins in the Rubber Industry," in which the performance of solvent-type resin adhesives is also discussed. We will gladly send one or more copies of this folder for the use of your staff.



For copies of this folder, please address Durez Plastics & Chemicals, Inc., 2711 Walck Rd., North Tonawanda, New York.



PHENOLIC  
RESINS

MOLDING COMPOUNDS

INDUSTRIAL RESINS

PROTECTIVE COATING RESINS

PHENOLIC RESINS THAT FIT THE JOB

## From Tires for Wheels



**Dutch Boy:** "Many different rubber products have one thing in common. They're better made with Red Lead."

**Manufacturer:** "But just what does Red Lead do?"

**Dutch Boy:** "It gives the seven advantages I've listed at right. Look them over."

**Manufacturer:** "But do I get all seven, no matter what I make?"

**Dutch Boy:** "With tires, all seven advantages are yours—but most of them apply with other products, too."

**Manufacturer:** "No matter what my base is?"

**Dutch Boy:** "Whether the base is GR-S, GR-S-10, GR-M, GR-A or GR-I. Just let us know your specific application and our technical staff will gladly supply literature and any other information you need. Drop a line to the Rubber Division of our Research Laboratories, 105 York St., Brooklyn 1, N. Y."



## ...to Rubber Heels

PLENTY OF REASONS  
FOR COMPOUNDING RUBBER  
WITH #2 RM ED LEAD

1. Improved Heat Stability—Retention of Elasticity
2. Lower Heat Build-up—Cooler Running
3. Economical
4. Faster Curing Rate
5. Extended Curing Range
6. Excellent General Physical Properties
7. Safe Processing

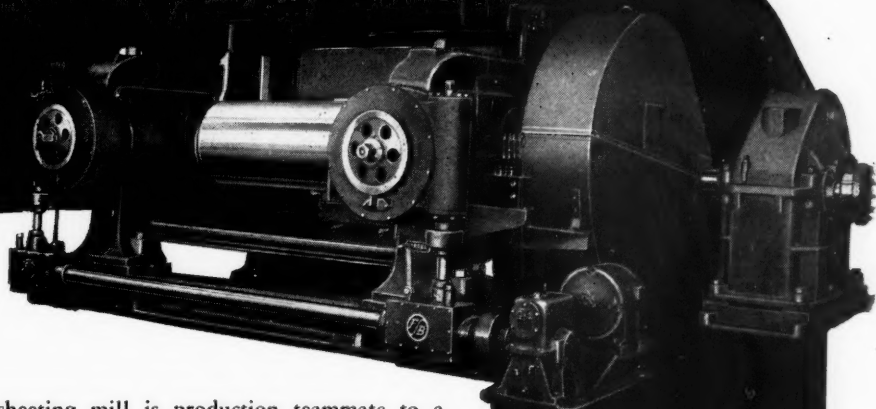


**NATIONAL LEAD COMPANY**—New York 6; Buffalo 3; Chicago 8; Cincinnati 3; Cleveland 13; St. Louis 1; San Francisco 10; Boston 6, (National Lead Co. of Mass.); Philadelphia 7, (John T. Lewis & Bros. Co.); Pittsburgh 30, (National Lead Co. of Pa.); Charleston 25, West Virginia, (Evans Lead Division).

If it's made with  
... it's better made with

**RUBBER  
ED LEAD**

# WHY THIS MILL



**T**his 26" x 84" sheeting mill is production teammate to a No. 11 Banbury. It is designed and custom-built to *fit the job* . . . to play an integral, efficiency-improving part in a rubber-making team.

The mill combines basic design principles, proven successful in the past, with more recently improved features that have also been thoroughly production-tested to prove their practical value.

Construction details include:

Mill rolls ground on bodies and journals, cored and fitted with interior pipe and overflow nozzles for the circulation of cooling water. Water-cooled, full bronze-lined journal boxes automatically force-feed lubricated.

Motor-operated adjustment of the front roll for accurate setting to exact gauge. Steel adjusting screws driven by separate motor through bevel and worm gearing. Clutches permit independent adjustment of either roll end. Swivel, shear-pin type breaker with pull-back connects each screw with its journal box.

Hand-operated strip cutter with two adjustable knives; swinging bank board mounted over the rear roll; self-adjusting guides; cut spur gears, bath-lubricated in oiltight guards; individual motor drive through enclosed reduction unit; cast Meehanite housings and stringer bedplates of extra heavy proportions, are some of the other features of this F-B production unit.

*When you need a mill to fit into your production set-up exactly, call on Farrel-Birmingham engineers for recommendations.*

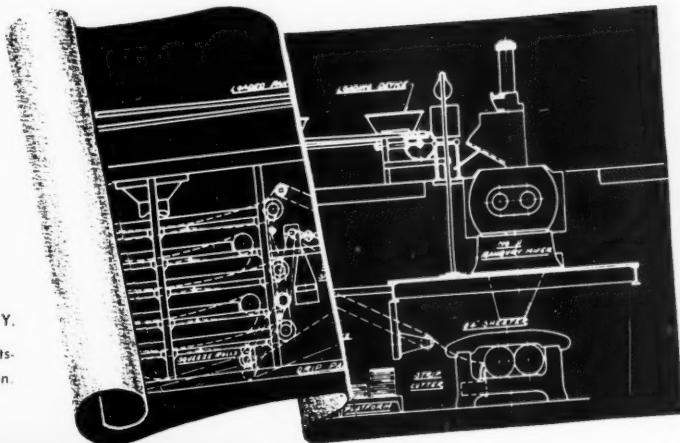
FB-344

**FARREL-BIRMINGHAM COMPANY, INC.**  
ANSONIA, CONN.

Plants: Ansonia and Derby, Conn., Buffalo, N. Y.

Sales Offices: Ansonia, Buffalo, New York, Boston, Pittsburgh, Akron, Chicago, Los Angeles, Tulsa, Houston.

**FITS INTO  
A  
PRODUCTION  
TEAM**



## Farrel-Birmingham

Rx *What the  
doctor ordered-*



# PELLETEx



Leading SRF Black  
for  
Non-Cracking  
Flexible  
Long Wearing  
RUBBER FOOTWEAR

MANUFACTURER  
**GENERAL ATLAS CARBON CO.**  
PELLETEx  
PAMPA, TEXAS  
GUYMON, OKLA.



DISTRIBUTOR  
**HERRON BROS. and MEYER**  
NEW YORK, N. Y.  
AKRON, OHIO



RLD



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# Picco HiSolv

AROMATIC  
PETROLEUM SOLVENTS

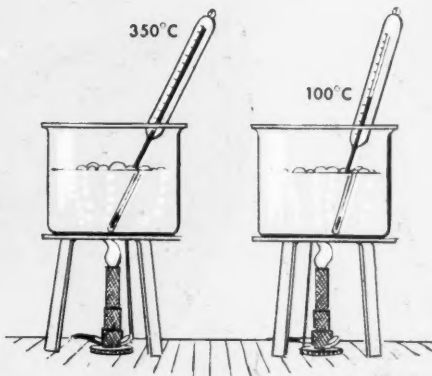
*fully refined... available now!*

Available now, and in large quantities, Picco HiSolv offers maximum solvent power per dollar invested. Some of the principal features of these high-quality products are illus-

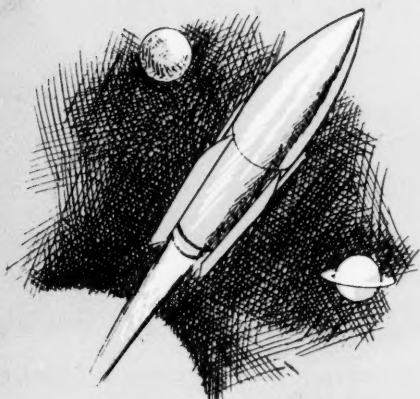
trated below. Check your solvent requirements, and write for samples of Picco HiSolv for inspection and comparison. Specify boiling range desired.



GOOD ODOR



WIDE RANGE OF BOILING POINTS



GOES FARTHER



WATER-WHITE



## PENNSYLVANIA INDUSTRIAL CHEMICAL CORP.

CLAIRTON, PENNSYLVANIA

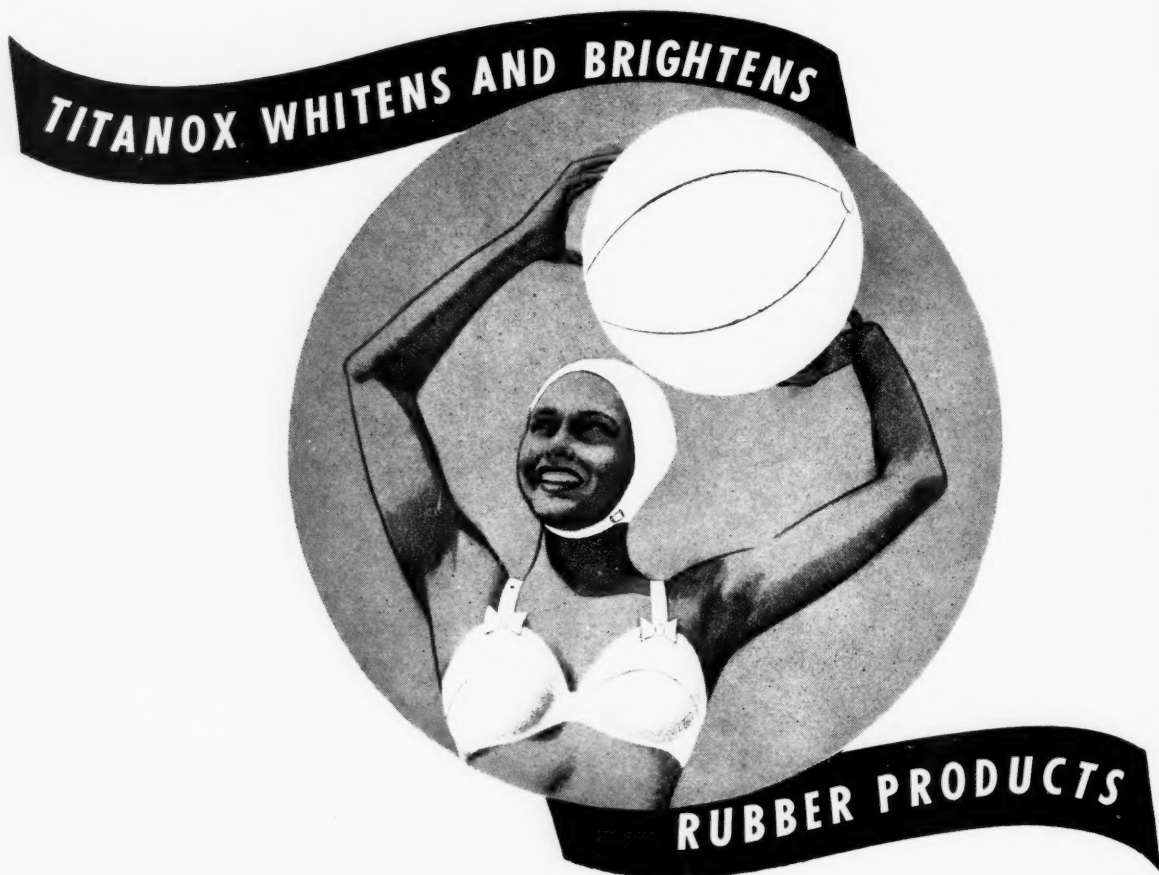
Plants at Clairton, Pa. and Chester, Pa.

Makers of: Coumarone Resins • Coal Tar Solvents • Styrene Resins • Rubber Plasticizers • Reclaiming Oils • Terpene Resins • High Solvency Naphthas • Solvent Oils

Distributors to the Rubber Industry

HARWICK STANDARD CHEMICAL CO. • Akron 8, Ohio

**TITANOX** . . . *the brightest name in titanium pigments*



*I*n white rubber beach wear, as in other white and tinted rubber products, a minimum of TITANOX provides a maximum of lasting whiteness and brightness. In industrial and mechanical rubber products, TITANOX also provides reinforcement and abrasion-resistance, thus contributing to long wear.

The staff of our Technical Service Laboratory will be happy to cooperate with you in solving your pigmentation problems. Contact them through your nearest Titanium Pigment Corporation office.

5073

# TITANOX

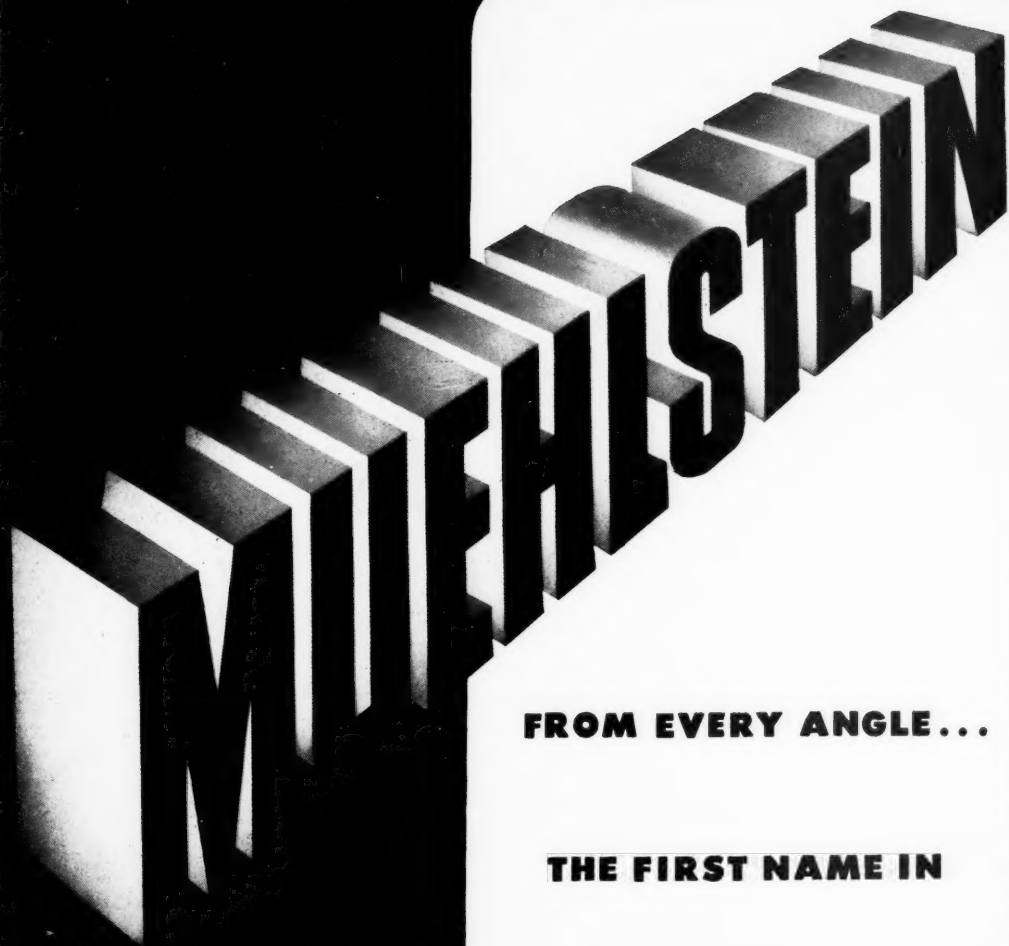
TRADE MARK

111 Broadway, New York 6, N. Y.  
104 So. Michigan Ave., Chicago 3, Ill.

**TITANIUM PIGMENT CORPORATION**  
SOLE SALES AGENT

350 Townsend St., San Francisco 7, Cal.  
2472 Enterprise St., Los Angeles 21, Cal.





**MUEHLSTEIN**

**FROM EVERY ANGLE...**

**THE FIRST NAME IN**

**SCRAP RUBBER**

**H. MUEHLSTEIN & CO.**  
—INC.—

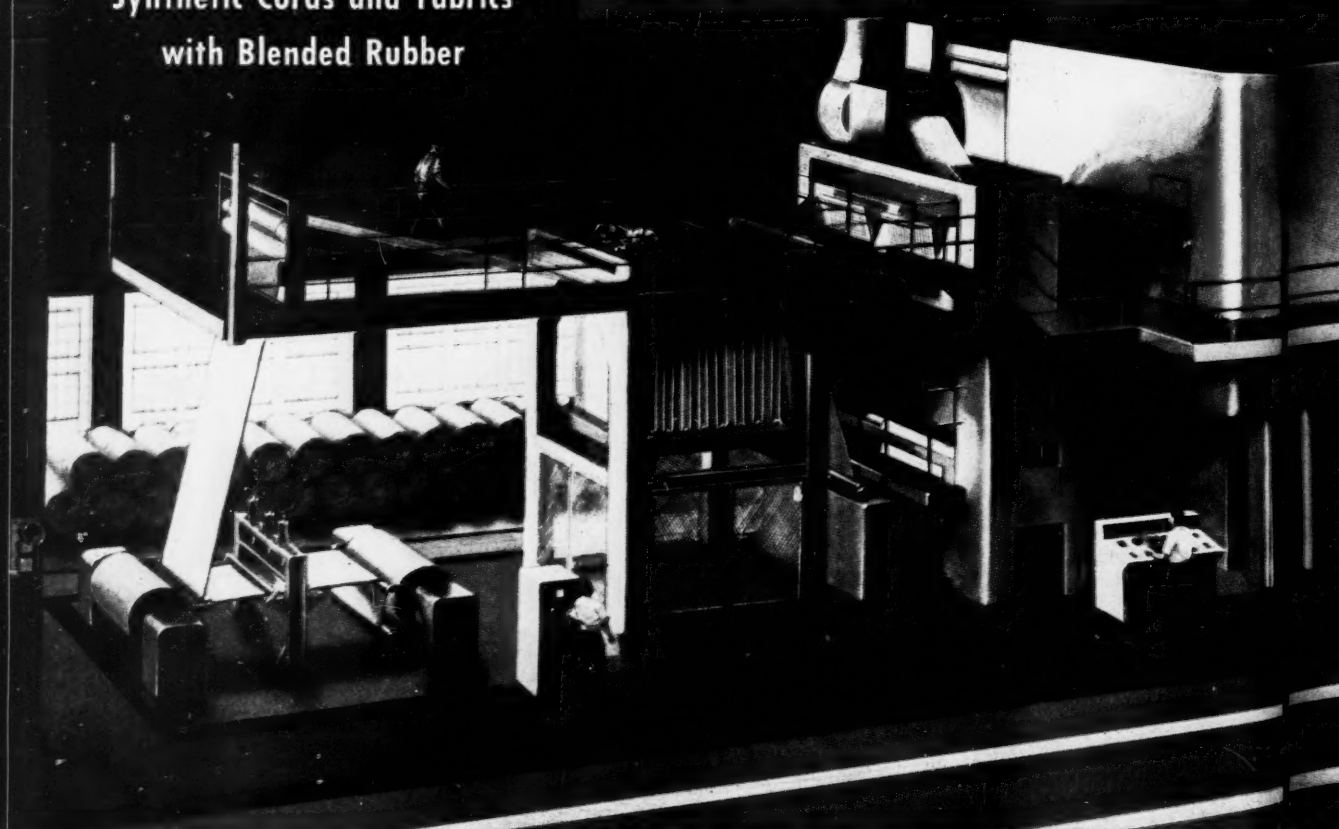
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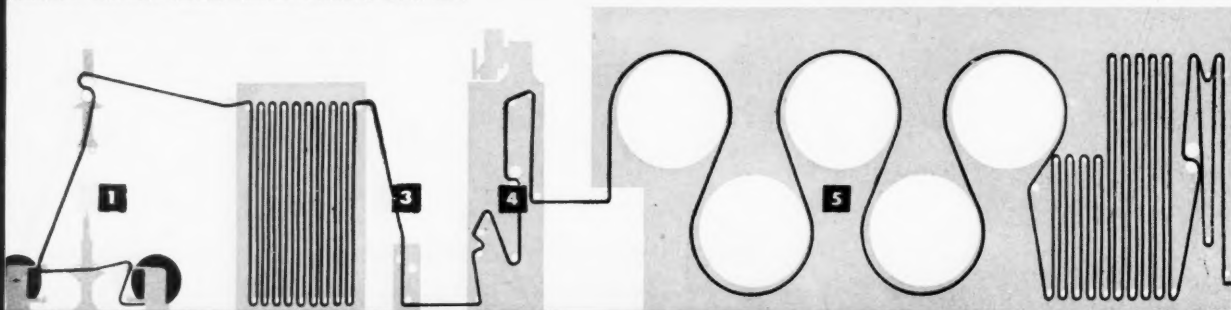
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For the treatment of  
all types of Natural and  
Synthetic Cords and Fabrics  
with Blended Rubber



COURTESY DAYTON RUBBER MANUFACTURING COMPANY

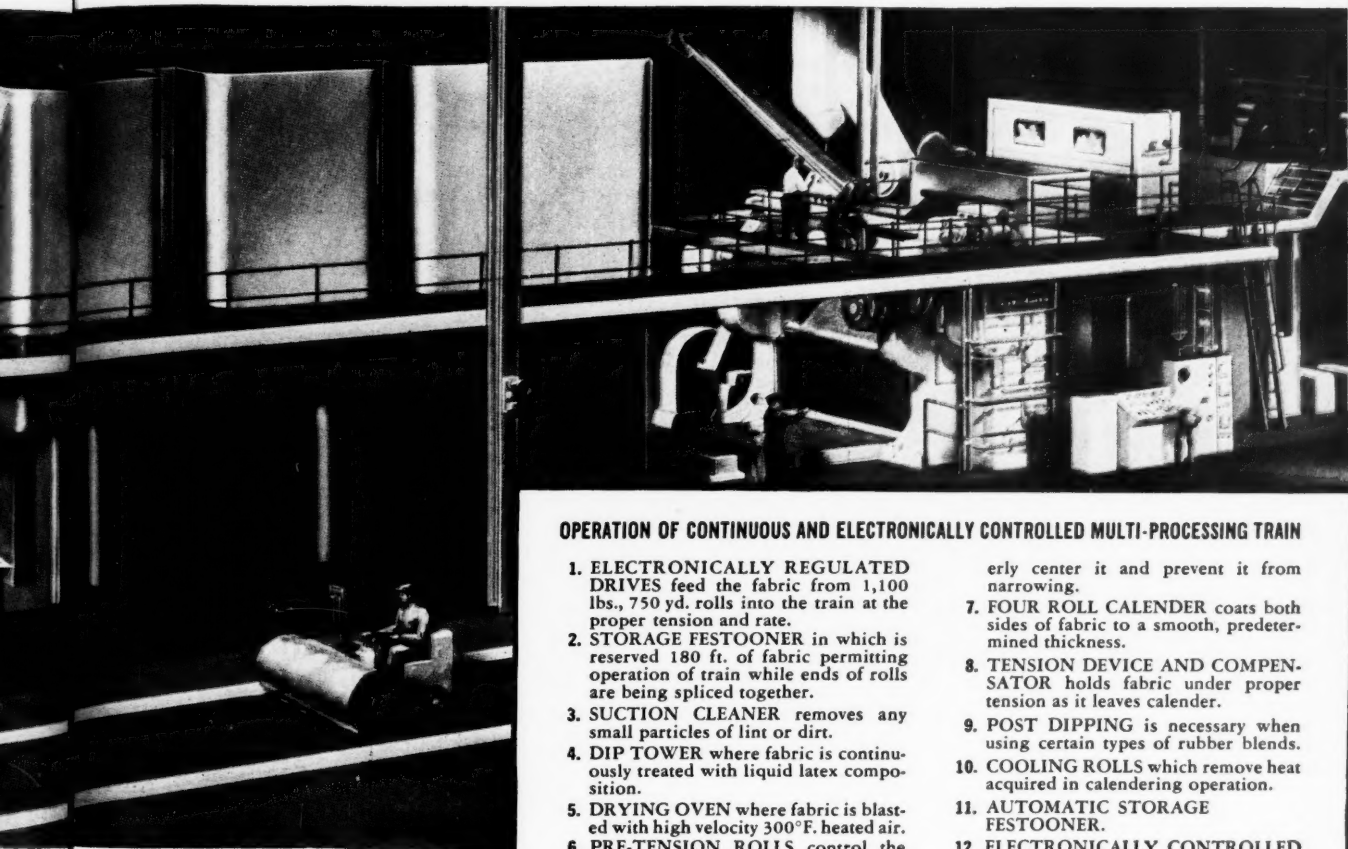


This all electronically controlled tandem operation, *the first ever to be assembled*, treats all types of natural and synthetic cord fabrics with blended rubber in one continuous, high speed operation, eliminating the frequent re-handling of material in the many separate and slower operations formerly required. The unit adjusts to predetermined standards, by finger-tip control, the strength and elongation of

the fabric, surrounding and impregnating each cord with blends of rubber. It dips, stretches, impregnates and coats at speeds up to 180 feet per minute. By synchronized electronic methods the highest quality of treated cords and fabrics is maintained to an exact degree of uniformity, with constant tension maintained at all points throughout the process.

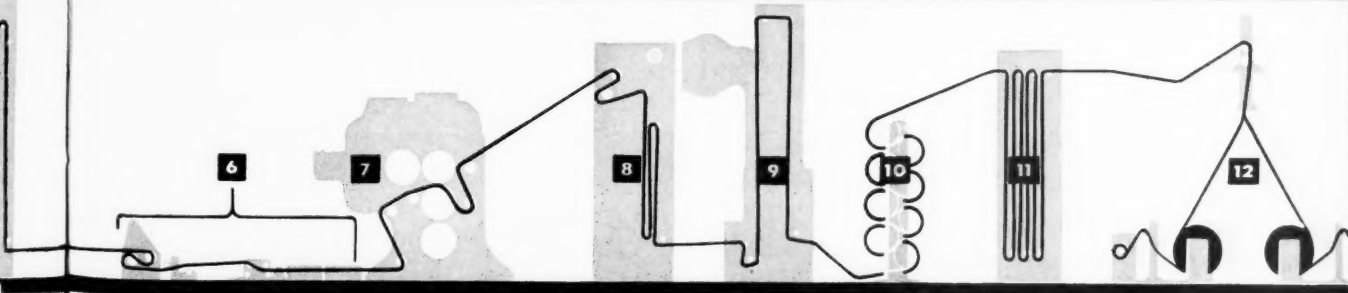
# controlled multi-processing train

Recently designed, built and installed  
by Adamson United Company  
for a prominent Tire Manufacturer



## OPERATION OF CONTINUOUS AND ELECTRONICALLY CONTROLLED MULTI-PROCESSING TRAIN

1. ELECTRONICALLY REGULATED DRIVES feed the fabric from 1,100 lbs., 750 yd. rolls into the train at the proper tension and rate.
2. STORAGE FESTOONER in which is reserved 180 ft. of fabric permitting operation of train while ends of rolls are being spliced together.
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4. DIP TOWER where fabric is continuously treated with liquid latex composition.
5. DRYING OVEN where fabric is blasted with high velocity 300°F. heated air.
6. PRE-TENSION ROLLS control the fabric entering the Calender to properly center it and prevent it from narrowing.
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10. COOLING ROLLS which remove heat acquired in calendaring operation.
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12. ELECTRONICALLY CONTROLLED WIND-UP MACHINES.



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# Technical Bulletin No. 38

on the Compounding of GR-S with Substantial Loadings of ZINC OXIDE

## Blends of Natural Rubber and X-141

(The Isoprene/Styrene Polymer)

## with 100 Parts of Zinc Oxide

(Refer to Technical Bulletins Nos. 24, 25, 27 and 34)

The following compounds were mixed separately under the same conditions, as far as possible:

### COMPOUNDS 38 - 38A

NATURAL RUBBER		X-141	
Smoked Sheet . . . . .	100.0	X-141 . . . . .	100.0
Sulfur . . . . .	3.0	Sulfur . . . . .	3.5
MBT . . . . .	1.0	MBT . . . . .	2.0
"Agerite" Powder . . . . .	1.0	Coumarone-indene Resin . . . . .	7.5
Stearic Acid . . . . .	3.0	E.L.C. Magnesia . . . . .	5.0
ZINC OXIDE . . . . .	100.0	ZINC OXIDE . . . . .	100.0

AS IN THE CASE of the previous study of blends of Natural Rubber and Synthetic (Technical Bulletin No. 34), the stocks were allowed to stand overnight, warmed up on separate mills the following day to approximately the same plasticity, and sheeted off thin. The required amounts for the blend were plied up and mixed thoroughly.

As might be anticipated from its composition, X-141 is more compatible with Natural Rubber than with GR-S-10 and the tensile, tear and rebound properties follow the mixture law quite closely.

The elongation of the blend is higher than that of the components, and the modulus is correspondingly low. The permanent set of the blend is also higher than that of the constituents.

Possibly the over-all fatty acid content is too high. The effect of eliminating stearic acid from the Natural Rubber compound is under investigation. Further work is being carried out using an accelerator combination which permits the elimination of

E.L.C. magnesia and coumarone-indene resin.

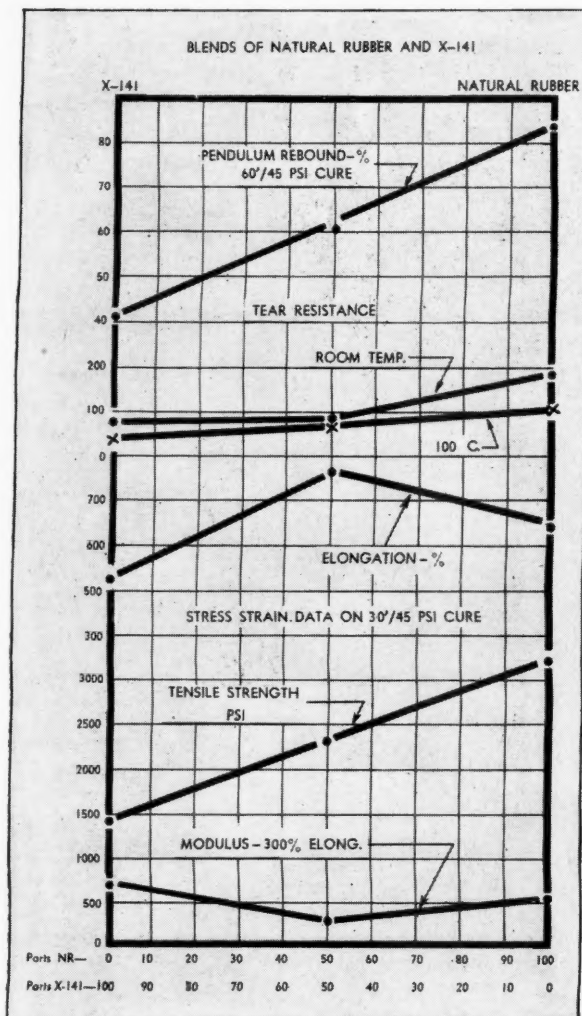


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1/2 sec. R.S. Nitrocellulose  
Viscosity, 18% "Vinylite"  
resin VYIII Solution  
Evaporation Time  
(Butyl Acetate = 8 hr.)  
Weight per gal. at 20°C.  
Specific Gravity at 20/20°C.

Diisobutyl Ketone	Ethyl Butyl Ketone
$C_4H_9COC_4H_9$	$C_4H_9COC_2H_5$
168.1°C.	117.8°C.
1.5	2.6
Gel Structure	112 cps
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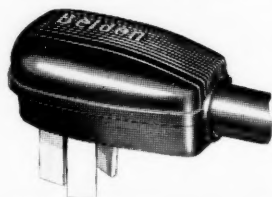


### Seven Elmes Hydrolairs Speed Production of New Designs at Belden Mfg. Co.

"We're getting excellent results with Hydrolairs," says R. K. Schelke, Engineer at Belden Mfg. Co.—wiremaker for industry. "They're exactly what we need for *quality and speed* on molded plugs and sleeves. And they save money all around—on first cost, production costs, and maintenance. Hydrolairs are easy to install, simple to use, *always dependable*."

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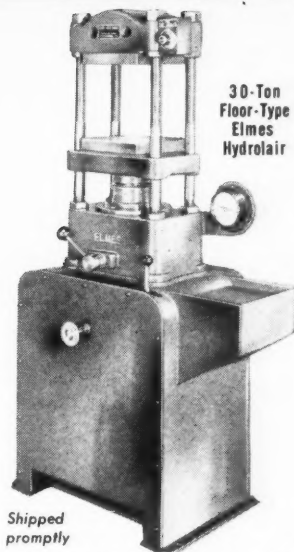
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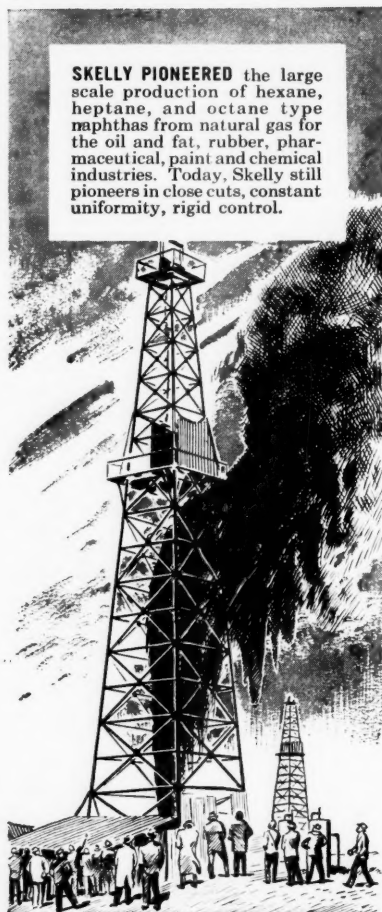
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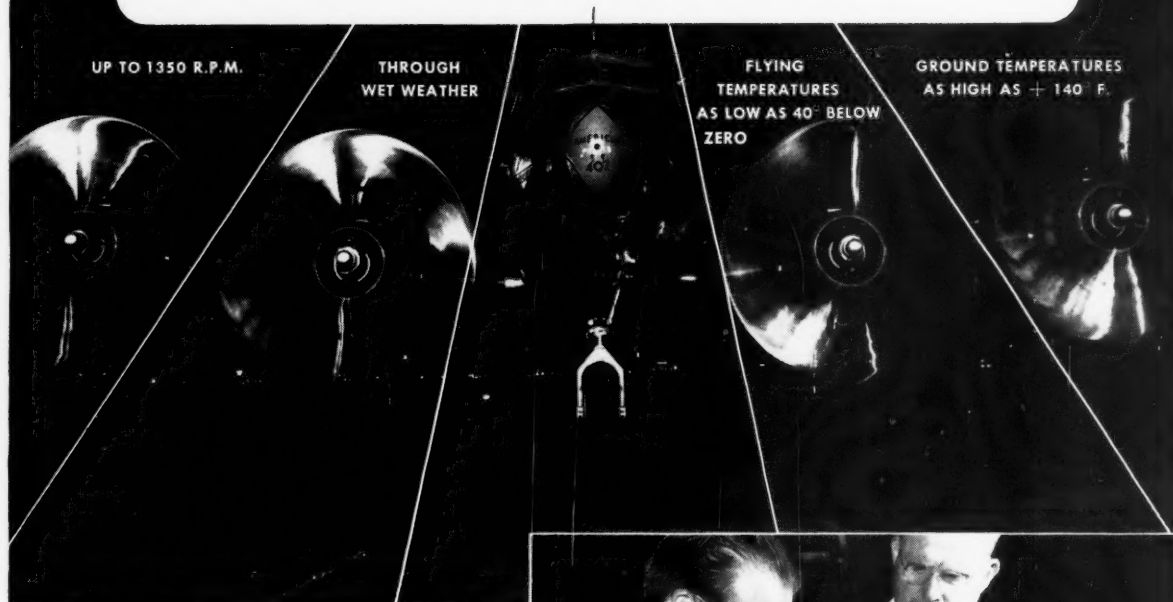
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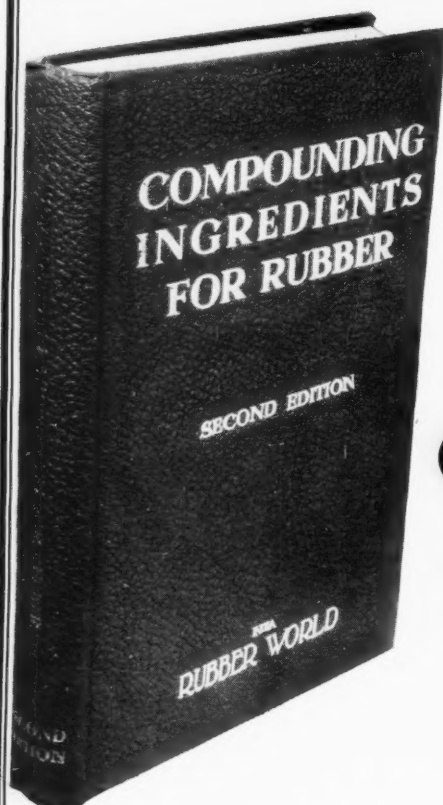
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Benzothiazyl disulfide . . . . .	1.5	1.5	1.5
Sulfur . . . . .	2	1.5	1.5
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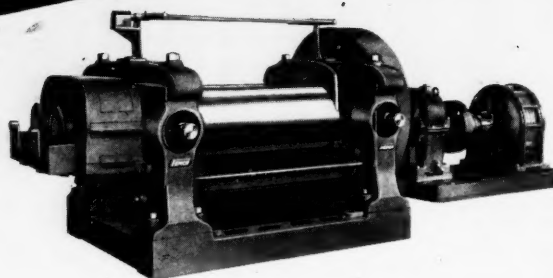
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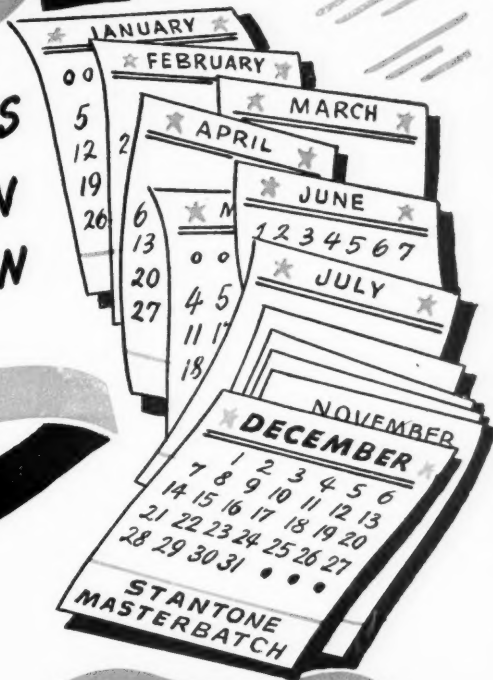


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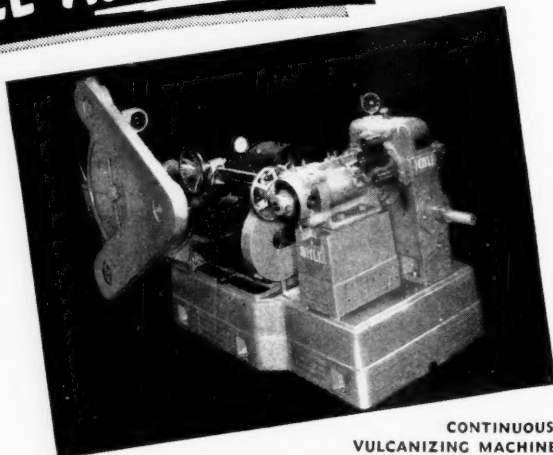
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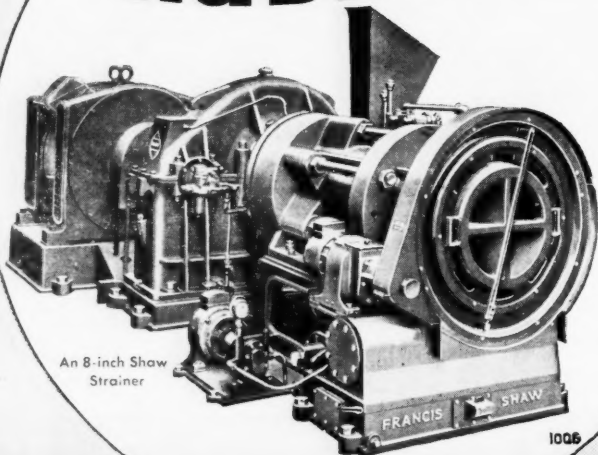
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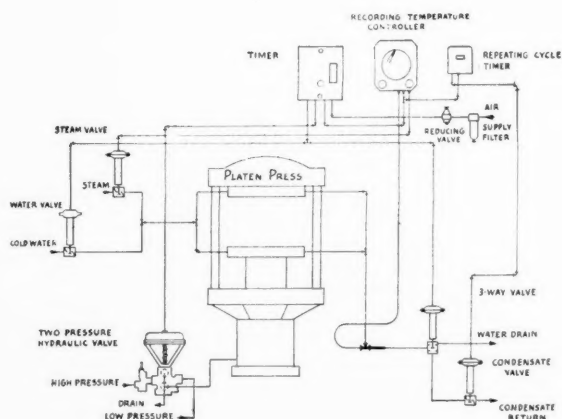
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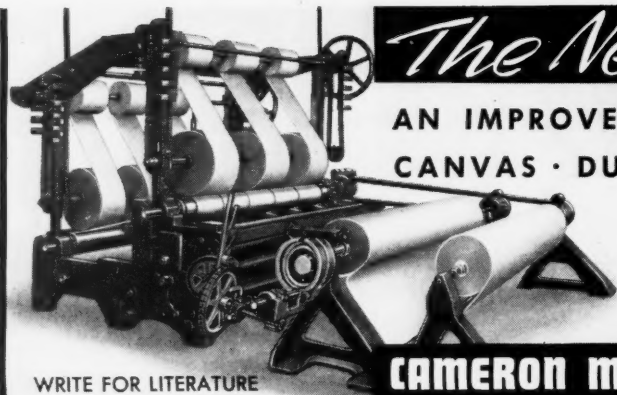
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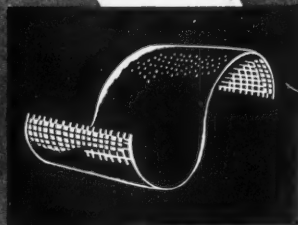
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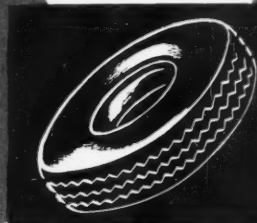
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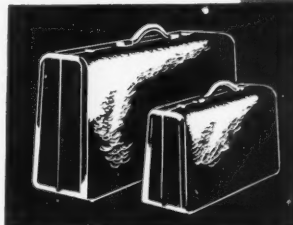
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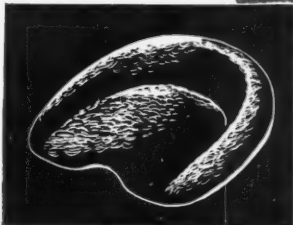
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November, 1947

INDIA

Volume 117

Number 2

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A Bill Brothers Publication

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Volume 117

New York, November, 1947

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R. F. Dunbrook<sup>2</sup>

**T**HIS paper by R. F. Dunbrook, former head of the Copolymer Research Branch of the Office Of Rubber Reserve, reviews the government research program on synthetic rubber from the viewpoint of the organic chemist. The paper discusses the effect of impurities in the various monomers and soap, modifiers, short-stopping agents, high-temperature polymerization, structure of GR-S, popcorn polymers and, in fact, all of the most important fundamental factors involved in the organic chemistry of synthetic rubber. Because of its length it will be necessary to present the paper in several installments.

EDITOR

**S**OON after Pearl Harbor, 90% of the source of our natural rubber supply was cut off, and this country was faced with a critical emergency in rubber. The great need was for a general-purpose rubber for tires and tubes since approximately 70% of our rubber consumption is used in their manufacture. Fortunately the United States Government had accumulated a stockpile of natural rubber which, however, was less than a normal year's supply. Research and pilot-plant work on synthetic rubber were already being carried on by some of the major rubber, oil, and chemical companies. Neoprene and Buna N, however, were the only synthetic rubbers being manufactured in quantity and were used as special-purpose rubbers where oil resistance was required. It thus became necessary to accelerate and greatly expand the immediate production of synthetic rubber if the war was to be won.

Rubber Reserve Co. (1)<sup>3</sup> was created by the Reconstruction Finance Corp. on June 28, 1940, to accumulate a stockpile of natural rubber as a safeguard against possible war in the Far East and to develop additional sources of natural rubber. After Pearl Harbor the activities of Rubber Reserve were primarily concerned with the development of a synthetic rubber industry in this country.

To expedite the development of synthetic rubber it was necessary to provide for full and effective exchange of technical information among those private organizations having useful knowledge and experience in the manu-

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In the Summer of 1942 the President appointed a Rubber Survey Committee to study the rubber problem. The report of this Committee (2) recommended that inventors and research groups be encouraged to do work in the synthetic rubber field, and the Executive Order of September 17, 1942, provided for the appointment of a Rubber Director. Included among his duties was full responsibility for technical research and development with respect to the nation's rubber program in all of its phases. At the request of the Rubber Director, Rubber Reserve Co. entered into contracts with a number of universities and research institutions covering research on synthetic rubber. The following universities and laboratories participated in the program on polymerization research.

### UNIVERSITIES

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<sup>1</sup> Presented before Division of Organic Chemistry, A.C.S., Chicago, Ill., Sept. 11, 1946.

<sup>2</sup> Office of Rubber Reserve, RFA, Washington, D. C. Present address: Firestone Tire & Rubber Co., Akron, O.

<sup>3</sup> Bibliography references appear at end of this installment.

This group was organized in December, 1942, and

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# INDIA RUBBER WORLD

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Stanford University  
University of Akron  
University of Chicago  
University of Cincinnati  
University of Illinois  
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### INDUSTRIAL LABORATORIES AND RESEARCH INSTITUTIONS

Bell Telephone Laboratories  
Bureau of Standards  
Hycar Chemical Co.  
Standard Oil Co. (N. J.)  
The B. F. Goodrich Co.  
The Firestone Tire & Rubber Co.  
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United States Rubber Co.

This group was organized in December, 1942, and

<sup>1</sup> Presented before Division of Organic Chemistry, A.C.S., Chicago, Ill., Sept. 11, 1946.

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<sup>3</sup> Bibliography references appear at end of this installment.

was known as the Copolymer Research Branch of the Research and Development Section, Office of Rubber Director, War Production Board. After the resignation of the Rubber Director on September 1, 1944, the Copolymer Research Branch (then Polymer Research Branch) was transferred to the Research and Development Division of Rubber Reserve Co. The government sponsored research program is being continued under the Office of Rubber Reserve, Reconstruction Finance Corp.

This paper is presented in an effort to give a summary of the work from all of these laboratories as it appears in reports to the Office of Rubber Reserve, a large number of which have not been published as yet. Manuscripts covering a large number of these papers have been prepared and cleared for publication and are now appearing in the literature. However certain interesting phases of the work conducted in this program are still in a stage where decisions on patentability have not been completed and have been omitted from this discussion.

In the time allotted to this symposium paper it will be possible to present only a few of the more important contributions of organic chemistry to the synthetic rubber program. Much of the research on butadiene and styrene, the principal raw materials for GR-S, has already been recorded in patents and journal articles. A large number of organic chemists was required in the development of commercial processes for the manufacture of these raw materials. The contribution of organic chemistry in this field could well be the subject of a separate symposium. Our discussion will therefore be confined to the contributions of organic chemistry in the field of polymerization as they relate to the GR-S program.

The various groups participating in the research program worked very closely together, and the results were carefully correlated. For this reason no clear-cut differentiation between the work of the organic, physical, and analytical chemists can be made. The progress made was due to the untiring efforts of the group as a whole. Therefore in the discussion of the contributions of the organic chemists the contributions made by the other groups must be kept in mind.

Germany had developed a synthetic rubber called Buna S which was made by copolymerizing butadiene and styrene in emulsion. Work was in progress in this country prior to 1941 on a similar copolymer, and satisfactory tire tests had been made both on the German Buna S and the American-made rubber. The two monomers, butadiene and styrene, required for Buna S synthetic rubber seemed capable of large-scale manufacture. Consequently a copolymer of the Buna S type prepared by copolymerizing 75 parts of butadiene with 25 parts of styrene was selected as the general-purpose rubber. The rubber was later designated as GR-S, signifying Government Rubber-Styrene type.

A number of systems of polymerization had been worked out in this country, and it became necessary to concentrate on one for large-scale manufacture. The one finally selected and known variously as the "Mutual Recipe," "GR-S Recipe," or "Standard Recipe" was as follows:

Butadiene	75
Styrene	25
Water	180
K <sub>2</sub> S <sub>2</sub> O <sub>8</sub>	.3
Dodecyl mercaptan	.5
Soap flakes	5.0

When these ingredients are mixed in the proportions indicated and heated with stirring at 50° C. for a period of about 12 hours, a synthetic latex containing approximately 30% rubber is obtained. The rubber can be

isolated by the additions of various coagulants, such as NaCl and acid, or aluminum sulfate. In commercial practice both are used. In the early days the conversion was carried to 78%. If carried above 78%, the solubility of the polymer in benzene decreases because of the formation of gel, caused by cross-linking. This makes the polymer difficult to process in the factory and adversely affects other properties of the rubber. Subsequently it was found desirable to stop the reaction at 72% conversion.

The rubber-like properties of the polymer vary with butadiene/styrene ratio and the amount of modifier (dodecyl mercaptan) used. At the present time a ratio of butadiene to styrene of 71/29 is used. The amount of modifier used also varies somewhat from plant to plant and depends on the rate and type of agitation used.

After selection of a recipe the research work was concentrated on a study of the variables in the process and how they affect the time of polymerization and the quality of the product. This involved a study of the impurities in the butadiene, styrene, soap, and modifier. The function of the modifier and its rate of disappearance were investigated. Efforts were directed toward the elucidation of the structure of the copolymer. New modifiers and monomers were synthesized and evaluated in the GR-S recipe. Obviously it will be possible to review only a few of the many investigations conducted in the government sponsored synthetic rubber program. In the selection of the topics for this paper, many of the collaborating groups were asked for suggestions, and from those received, the ones mentioned most frequently were included.

### Effect of Impurities in the Butadiene, Isoprene, Styrene, and Soap

In the early days of the synthetic rubber program the butadiene was obtained from different sources and different raw materials. Alcohol and petroleum were the principal raw materials. Methods of purification were worked out by the chemical and petroleum companies, and butadiene of high purity was soon available. The rate of polymerization, however, varied considerably from batch to batch. It therefore became necessary to investigate the effect of small amounts of other hydrocarbons which were likely to be present in rather pure butadiene. In general, it may be stated that the type of impurity was of greater importance than the amount.

Certain hydrocarbons were found to have no effect on the rate of polymerization or the solubility of the polymer in benzene when present in concentrations up to 0.1% on the butadiene (3). Thus the C<sub>4</sub> saturated hydrocarbons, butane and isobutane, the C<sub>3</sub>, C<sub>4</sub> and C<sub>5</sub> olefins and diolefins, propylene, butene-1, butene-2, isobutene, pentene-1, pentene-2, propadiene (allene), methyl allene (1, 2-butadiene), piperylene, isoprene, 1,4-pentadiene and the C<sub>3</sub> and C<sub>4</sub> acetylenes were without effect in low concentrations.

Some of these hydrocarbons, when present in larger amounts, have a retarding effect on the rate of polymerization as is shown in Table I (4). Normal and isobutane in concentrations up to 2% show relatively little effect on the rate of polymerization. The C<sub>4</sub> and C<sub>5</sub> olefins have somewhat greater effect. Vinyl acetylene, 1,4-pentadiene and butadiene dimer (5) (1-vinyl- $\Delta^3$ -cyclohexene) show the largest effect on the rate of polymerization and the properties of the polymer. Vinyl acetylene, though it shows no effect on the rate of polymerization when present to the extent of 1% on the butadiene, gives rise to large amounts of benzene-insoluble gel in the polymer. 1,4-Pentadiene and butadiene dimer

(1-vinyl- $\Delta^3$ -cyclohexene) show marked retardation of the rate of polymerization.

TABLE 1. EFFECT OF IMPURITIES IN BUTADIENE ON POLYMERIZATION OF BUTADIENE-STYRENE (75:25)

Contaminant	Conc. %	% Decrease in Conversion
Isobutane	1	0.4
	2	0.75
n-Butane	1	0.9
	2	1.5
Isobutylene	1	0.8
	2	1.9
	5	5.0
	10	10.0
Butadiene-1,2	1	0.9
	2	3.8
High boiling Butene-2	1	2.0
Butene-1	1	1.5
	2	5.6
Low boiling Butene-2	1	2.2
	2	5.8
1-Pentene	1	5.0
2-Pentene	1	3.0
Allene	1	8.0
1,4-Pentadiene	.01	No effect
	0.1	1.6 (lowers intrinsic viscosity)
	1.0	13% of polymer
Vinyl acetylene	.01	No effect
	0.1	No effect
	1.0	No effect, but 50% gel in polymer
Butadiene dimer	.003	No effect
	.03	No effect
	.3	2.3
	1.0	3.1
	2.0	6.3
	4.0	12.0
Propylene	1	No effect
Methylallene	1	No effect
Piperylene	1	No effect
Isoprene	1	No effect
Ethyl acetylene	1	No effect
Dimethyl acetylene	1	No effect

The effect of other impurities which are likely to be present in butadiene in small amounts was investigated and is shown in Table 2. Methyl and ethyl mercaptan in small amounts show marked retardation; while ammonia up to 0.10% has little retarding effect. The effect of phenyl- $\beta$ -naphthylamine is shown since it was used as antioxidant for the commercial rubber.

TABLE 2. EFFECT OF IMPURITIES IN BUTADIENE ON POLYMERIZATION OF BUTADIENE-STYRENE (75:25)

Substance	Conc. %	% Decrease in Conversion
Acetaldehyde (3)	0.1	No effect
	1.0	No effect (lower intrinsic viscosity)
Ammonia (6)	.10	No effect on rate or properties
Methyl mercaptan	.001	No effect
	.01-0.1	Serious retarder
Ethyl mercaptan	.001	No effect
	.01-0.1	Serious retarder
Phenyl- $\beta$ -naphthylamine	.2	24.3%

### Effects of Impurities in Isoprene

TABLE 3. EFFECT OF IMPURITIES IN ISOPRENE ON POLYMERIZATION OF ISOPRENE-STYRENE (75:25)

Hydrocarbon	% Conc.	Effect on Conversion
n-Pentane	1	No effect
Isopentane	1	No effect
Cyclopentane	1	No effect
Dicyclopentadiene	1	No effect
1,2-Butadiene	1	No effect
Dimethyl acetylene	1	No effect
n-Propyl acetylene	1	No effect
Isopropyl acetylene	1	No effect
1-Butene	1	Slight retarding effect
Cis-2-butene	1	Slight retarding effect
Trans-2-butene	1	Slight retarding effect
Isobutene	1	Slight retarding effect
1-Pentene	1	Slight retarding effect
Trans-2-pentene	1	Slight retarding effect
2-Methyl-1-butene	1	Slight retarding effect
2-Methyl-2-butene	1	Slight retarding effect
Cyclopentene	1	Slight retarding effect
3-Methyl-1-butene	1	6% decrease
Isoprene dimer	1	Substantial retardation
1,3-Pentadiene (piperylene)	1	Substantial retardation
Piperylene dimer	1	Substantial retardation
Vinyl acetylene	1	Substantial retardation
Carbon bisulfide	1	Substantial retardation
1,4-Pentadiene	1	Strong retarder
Cyclopentadiene	1	Strong retarder
Ethyl mercaptan	1	Strong retarder

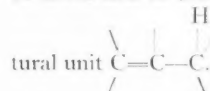
The possibility of using isoprene as complete or partial replacement for butadiene made it desirable to study the effects of impurities in isoprene on the rate of

polymerization and properties of the polymer. Table 3 shows the effect of the impurities on conversion (7).

n-Pentane, isopentane, and cyclopentane have no effect on the polymerization rate in concentrations up to 1% of the isoprene.

The effects of unsaturated hydrocarbons vary according to their structure. Olefins of the type  $\text{C}=\text{C}-\text{CH}_2-$

containing an allylic methylene group, although showing some variance, have in general a slight retarding effect, ranging from 1% to 3% at concentrations of 1% of the isoprene. Cyclopentene and 3-methyl-1-butene show a greater retarding effect than most of the other olefins. Cyclopentene contains two allylic methylene groups in the molecule which may explain its greater retarding effect. The retarding effect of 3-methyl-1-butene may be attributed to the allylic methinyl group in the struc-



tural unit. Frank (7) suggests that retarders act as "inefficient chain transfer agents" being capable of reacting with growing chains to terminate their growth, but incapable of initiating new chains at a comparable rate. The fact

that compounds containing the structural unit  $\text{C}=\text{C}-\text{C}$

are stronger retarders than those containing the unit  $\text{C}=\text{C}-\text{CH}_2-$  may be used as indirect evidence that retardation occurs by removal of the allylic hydrogen atom to form radicals of the type  $\text{C}=\text{C}-\dot{\text{C}}$ . Tertiary hydro-

gen atoms are generally more reactive than primary or secondary hydrogen atoms.

Piperylene, its dimer, and the isoprene dimer show substantial retardation. Examination of the structures of these dimers shows that each, like 3-methyl-1-butene,

contains the structural unit  $\text{C}=\text{C}-\text{C}$  which thus appears to effect the polymerization rate.

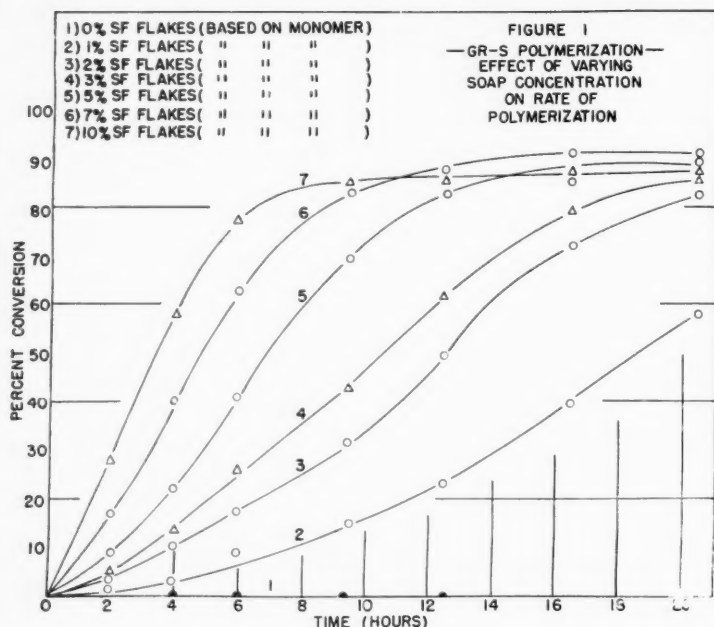
The apparent anomaly of lack of retardation shown by dicyclopentadiene may be explained by further examination of its structure. Dicyclopentadiene differs

from the others in that its allylic methinyl groups ( $-\text{C}-$ ) are located at the bridgeheads of the molecule. That

this prevents the structural unit  $\text{C}=\text{C}-\text{C}$  from retard-

ing polymerization has been confirmed by testing the effects of two similar compounds, di- $\Delta$ -pinene and camphene. Although not to be considered as possible impurities in commercial isoprene, they both have allylic methinyl groups located at their bridgeheads. Neither shows any retardation of polymerization.

1,4-Pentadiene and cyclopentadiene are the strongest retarders of all the hydrocarbons tested. They are perhaps the principal cause for the unsatisfactory rate of polymerization in commercial isoprene. The effect of 1,4-pentadiene and cyclopentadiene in concentrations of 0.01, 0.1 and 1.0% on the intrinsic viscosity of the



polymer is shown in Table 4. It is of interest that with retarders present, the intrinsic viscosity decreases with increasing retarder action while the polymer remains soluble. Thus retarders in general shorten the chain length of polymers, but do not bring about cross-linking.

TABLE 4. EFFECT OF 1,4-PENTADIENE AND CYCLOPENTADIENE ON SOLUTION VISCOSITIES OF ISOPRENE-STYRENE (75:25) COPOLYMERS

Impurity	Amt. of Impurity Based on Isoprene	Intrinsic Viscosity of Polymer (at 82 $\pm$ 3%) Conversion
Control	0.00	2.63
1,4-Pentadiene	0.01	2.42
1,4-Pentadiene	0.10	1.72
1,4-Pentadiene	1.00	1.42
Control	0.00	2.43
Cyclopentadiene	0.01	2.13
Cyclopentadiene	0.10	1.26
Cyclopentadiene	1.00	0.94

Note: All the polymers were benzene-soluble.

Dimethylacetylene, n-propylacetylene, and isopropylacetylene show some variation in inhibitory effect, although slight in any case. Vinylacetylene, on the other hand, has a marked retarding effect on polymerization. The presence of vinylacetylene causes greatly lowered solubilities in the resulting polymer, as shown in Table 5.

TABLE 5. EFFECT OF VINYLACETYLENE ON THE SOLUBILITY OF ISOPRENE-STYRENE (75:25) COPOLYMERS

% Conversion	Conc. Vinylacetylene in Isoprene	% Solubility in Benzene
52	0 (Control)	98
71	0 (Control)	99
80	0 (Control)	97
88	0 (Control)	79
98	0 (Control)	29
53	0.01	97
71	0.01	87
80	0.01	75
96	0.01	29
56	0.10	98
72	0.10	70
80	0.10	47
94	0.10	20
48	1.00	46
66	1.00	23
75	1.00	17
83	1.00	14

#### Effect of Impurities in Styrene on GR-S Polymerization

The effect of impurities which are likely to be present in styrene was also determined (3). Ethylbenzene, o-xylene, methylphenyl carbinol, and acetophenone show

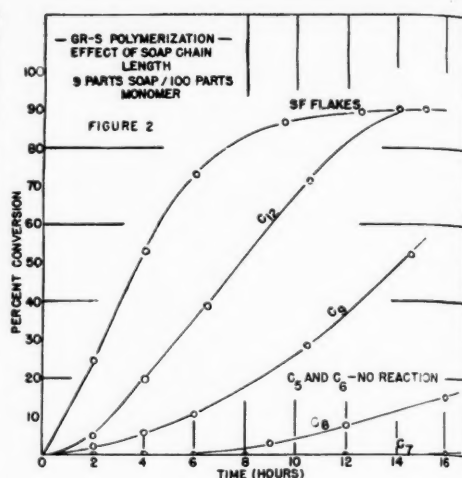
no effect on the rate of polymerization, solubility, or intrinsic viscosity of the polymer. Phenyl acetylene in a concentration of 0.01% based on styrene accelerates the rate of polymerization, but in higher concentrations up to 1% has no effect on rate of polymerization or solubility of the polymer. Para-divinyl benzene has little effect on rate of polymerization, but acts as a cross-linking agent giving a polymer containing high benzene-insoluble gel.

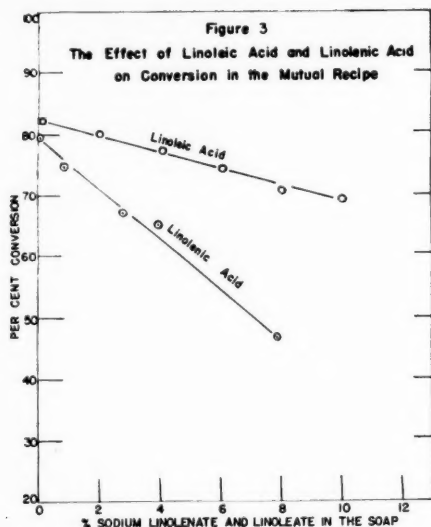
For use in the manufacture of tires, it seems desirable to keep the gel content of GR-S at a minimum. Styrene free from p-divinyl benzene is therefore used for polymerization. For other types of calendered and tubes stocks, GR-S having a high gel content has certain advantages. Addition of small amounts of p-divinyl benzene to the GR-S polymerization formula produces a polymer with improved processing characteristics as measured by calender shrinkage, rugosity, and tubing swell (8).

#### Effect of Impurities in Soap on GR-S Polymerization

Soap is the emulsifier used in the GR-S recipe. The function of the soap is to solubilize the monomers and modifier and act as the locus of reaction during the early stages of the polymerization (9). The micelles are the principal locus of reaction until a conversion of about 13% is reached. At this point most of the micelles have disappeared and the monomer-polymer particle becomes the locus of reaction (10). The rate of polymerization increases with increasing soap concentration and with the number of carbon atoms in the fatty acid chain, as is shown in Figure 1 and Figure 2 (11). Fatty acids with less than eight carbon atoms do not function as emulsifiers; while those containing more than 18 carbon atoms are unsatisfactory because they are only slightly soluble in water (12). Soap flakes which consist of a mixture of fatty acids are used in the GR-S plants.

In the early work on the GR-S recipe, it was noticed that the conversions for a given time of polymerization with soaps from different sources varied rather widely, and an investigation of the effects of impurities was undertaken (13, 14). Antioxidants such as lecithin and tocopherols were isolated and added to the polymeri-





zation recipe in concentrations equivalent to that found in beef tallow, and it was found that the polymerization rate was not influenced. Lecithin in amounts up to 0.4% of the soap content had no retarding influence on the GR-S polymerization.

Choline, a saponification product of lecithin and a substance more likely to be present in the finished soap, had no retarding influence when present in amounts up to 1% of the soaps.

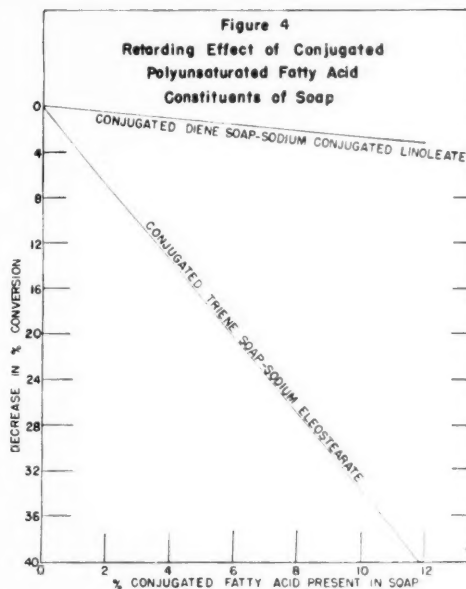
Likewise ethanolamine, a saponification product of cephalin, which is a constituent of crude lecithin, does not have an inhibitory effect on the GR-S polymerization when present in amounts up to 1% of the soap. Tocopherols reduce the conversion 4% to 5% when present in concentrations of 0.1% of the soap content. However tocopherols would not be present in tallow soap in excess of a few thousandths or at most a few hundredths of 1%. It has, however, been demonstrated that the presence of 0.4% tocopherols causes an induction period in the GR-S recipe.

A program of carefully purified fatty acids was undertaken at the Eastern Regional Laboratory (14), and the results of testing these materials showed that stearic, palmitic, and oleic acids give uniform polymerization rates; while linoleic, linolenic and arachidonic acids sharply retard the polymerization rate. The curve in Figure 3 indicates that 10% linoleic acid in the soap decreases the conversion for a given time 13%, or, in other words, 1% of linoleic acid decreases the monomer conversion 1.3%.

For linolenic acid, the curve shows that 10% linolenic acid present in the soap decreased the conversion 40%; thus, 1% linolenic acid decreases the conversion 4%. This indicates that linolenic acid is 3.1 times as potent a conversion retarder as linoleic acid.

For theoretical reasons, the effect of conjugated polyunsaturated fatty acids on the conversion rate was investigated. It was found that the conjugated diene soaps appear to have a negligible retarding influence on the conversion; however, the conjugated triene soaps: namely, sodium eleostearate, have a marked effect, as shown by the curve in Figure 4.

Partial, selective hydrogenation of fats was found to eliminate multiple unsaturation which is responsible for retardation during polymerization. Soaps essentially free from such substances were found to behave uniformly and to give a faster reaction than standard soaps used, even though the hydrogenated soaps were prepared from



lower grade tallows. It was not necessary completely to hydrogenate the soap, but only to hydrogenate sufficiently to remove multiple unsaturation.

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(To be continued)

"Green Book 1947-48 Buyers Directory." Schnell Publishing Co., Inc., 59 John St., New York 7, N. Y. 1384 pages. This thirty-fifth annual edition shows an increase of 88 pages over the preceding directory, with consequent increase in the number of chemicals, oils, drugs, and related materials listed with their suppliers and manufacturers. This edition again shows four divisions of subject matter: chemicals and related materials; equipment and operating supplies; technical and commercial services; and addresses of suppliers. Suppliers of rubber and latex chemicals and compounding ingredients are included.

# Textile Products for the Rubber Industry<sup>1</sup>

Lewis Larrick<sup>2</sup>

**A** MERICAN industry prides itself on being a mass-production industry. What other industry can class itself with the textile industry, when we consider the raw material with which it has had to deal? We in the textile industry have no powder or liquid to pour; we have no continuous lengths of material to process. Instead we deal with discontinuous macroscopic units of matter, with lengths of the order of magnitude of one inch and diameters (or cross-sectional dimensions) of the order of 10 microns—a ratio of length to width of at least 1,000:1. These we must assemble, roughly straighten, and render parallel to each other, with as few as 10 (300's yarn) and as many as 1,000 (8-10's yarns) in the cross-section of the yarn. We must deliver these assemblages in continuous lengths as long as 1,000 yards. Yet, withal, it has been said that the industry can spin a length of yarn one block long cheaper than a boy can be hired to draw a chalk line the same length.

## Fibers in General

How do we describe these building blocks (fibers and yarns) with which the textile industry has had to deal? As our heritage is what it is, we naturally turn to those natural fibers which have achieved dominant economic importance through the years and compare the properties of other fibers with them. The four natural fibers that have assumed a dominant position are: linen, wool, silk, and cotton. There are many other commercially available fibers—about 100 vegetable fibers, 15 animal fibers, and three mineral natural fibers—but the first four are the fibers used in the largest amounts in industry.

Linen-like fibers are the strongest of natural fibers (tensile strength as great as 150,000 p.s.i.), but have a certain characteristic lack of "give."

Wool-like fibers are characterized by springiness and a high elastic recovery, but are weak. The strength of the wool fiber, however, may be as great as 28,000 p.s.i.

Silk fibers, which may be considered primarily as continuous filaments, are strong, flexible, and have a relatively high elongation. The silk fiber may have a strength as high as 88,000 p.s.i.

Cotton is one of the strongest natural fibers with tensile strength up to 100,000 p.s.i., but is rather stiff, with only a moderate "give."

These are only descriptive terms—engineers and scientists require more definite definitions than these. Obviously one would like to measure strength in units of pounds per square inch. However in the textile industry we deal with building blocks (fibers and the yarns) which are essentially one dimensional materials. Consequently we generally speak of strength in terms of linear density rather than volume density—that is, we use the term tenacity for the strength of fibers and yarns instead of the pounds per square inch. By tenacity we mean the breaking strength per unit yarn number,

**T**HIS talk on textiles used by the rubber industry is of special interest because of its analysis of the development of the use of certain fibers and yarns by the rubber industry and the emphasis on the lack of understanding by the textile manufacturer of the requirements of the rubber industry and *vice versa*. The author asks several questions regarding specifications for textiles as prepared by the rubber industry, which seem to lend support to his plea for a greater degree of cooperation between the two industries in the discussion and solution of their mutual problems. EDITOR.

using the direct system of numbering, and we generally express tenacity as grams per denier or grams per grex.

Unfortunately strength is rather a primitive concept and difficult to define, let alone measure for textile materials. Fortunately the engineer tries to design his products to operate at stresses far below the ultimate strength. Consequently he is interested in the properties of materials far below their ultimate limiting values i. e., below their yield points. Although textile fibers and yarns seldom exhibit any linear region of the stress-strain curve and rarely show a well-defined yield point, much can be learned from this conventional curve.

The descriptive term stiffness is in its primitive connotations associated with the idea of bending. Since in engineering materials bending involves both tension and compression, the measure of stiffness has become attached to the slope of the stress-strain curve. By analogy we can derive a measure of stiffness of textile fibers and yarns by using the slope of the tangent to the stress-strain curve at the origin. You may even call this an elastic modulus, if you please, although it is questionable whether there is a modulus in the classical concept. This measure of stiffness will give an index to the ability of the material to carry a load without deformation.

Of great interest to the engineer designing such products as rubber goods is the ability of his material to withstand large deformations or shock loadings without rupture. The measure of toughness, in theory, is the area under the normal stress-strain curve. Since the stress-strain curves of most materials are concave toward the elongation axis, a simple index of toughness, for practical purposes, is the product of the breaking stress by the breaking elongation—this is frequently used and is known as the break constant.

The engineer is also interested in knowing the ability of the matter to recover from deformation. A perfectly elastic material will recover completely; a highly elastic material will recover almost completely from a finite deformation.

Textile materials have much in common with rubber and indeed with all other products of Mother Nature. One common property is the tendency to flow under continued stress. Since creep and permanent set are always present, even in such materials as glass, or granite, or steel, and even more prevalent in the high polymeric materials with which the textile and the rubber engineer work, it is well nigh impossible to find a perfectly elastic material. In textile materials, however, as in rubber, a region can be found on the stress-strain curve over which the material will act for all practical purposes as though it were perfectly elastic. For any textile fiber a value of the stress can be found below which the material will recover from deformation.

Associated with the elastic properties of the fiber and

<sup>1</sup> Presented before the New York Rubber Group, Apr. 11, 1947.

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also with the toughness, but probably of more significance than either of these two, is the resiliency or the ability of the material to absorb energy on loading and to give up energy upon unloading. The measure of resiliency is the ratio of the area under the recovery part of the tension stress-strain curve to the area under the loading part of the curve.

Surprisingly, each fiber exhibits a maximum resiliency which occurs at a different strain for each fiber. Loasby<sup>3</sup> finds, for instance, that nylon has a recovery power of 50% at 8% strain; silk has a recovery power of 30% at 3% strain; high-tenacity viscose rayon has a recovery of 11% at 14% strain; while cotton has a recovery power of 15% at 4% strain. Since all the fibers exhibit hysteresis on the load recovery curves, resiliency is a complete function of the strain for each fiber and must be studied very carefully for best product design.

Let us recapitulate for a moment the descriptive terms used above in the light of these engineering definitions. (The extremes of the strength scale are *strong* and *weak*; the antonym of *stiff* is *pliant*; at the other end of the scale from *tough* is *yielding* or *brittle*.) Arranged on this scale we find the linen-like fibers at the top of the scale of strength, but these fibers are stiff and brittle. Cotton is a fairly strong fiber; it is somewhat stiff, but is more pliant than linen, and rather tough. Silk is weaker than cotton, but is pliant and tough. Wool is rather weak, but pliant and tough—on the toughness scale we would have to rate silk higher than wool although both of these fibers are tougher than cotton or linen.

It has been said that once the desired properties are known and defined, man can tailor a molecule to give the desired results. (Of course economically man has an added advantage over nature in that man can produce the fibers in continuous filaments instead of in short fibers—this advantage lends itself to greater economy in processing and to better utilization in the yarn and fabric of the inherent properties of the fiber itself.) Let us see how well man has proved this claim in the fibers which are now commercially available.

Let us assign a specific problem: we want a fiber with the tenacity of linen, the pliability of wool and the toughness of silk. We find (according to Smith's Marburg lecture)<sup>4</sup> that man has exceeded the tenacity of flax or linen in nylon, glass, and saponified acetate. We find he has exceeded the pliability of wool in the high impact strength acetate rayon in Vinyon E. The toughness of silk has been exceeded by nylon, both in the strong and regular grades, and by vinylidene chloride.

*No one fiber is stronger than linen, more pliable than wool, and tougher than silk.*

However both high-tenacity nylon and vinylidene chloride are closely approximate to the desired properties when tested at ordinary room temperatures and humidity. We also find that in these three properties Fiberglas closely approximates linen with the added advantage of being available in continuous filaments. We must admit that on the basis of these examples man has done a good job of tailoring fibers, and we must expect that as the requirements become more definitely known, we will do an even better job.

All the problems and questions of the textile industry are not answered by preassigning values to these three simple engineering properties or to related properties.

<sup>3</sup>J. Textile Inst., 34, 45 (1943).

<sup>4</sup>Am. Soc. Testing Materials, Proc., 44, 542 (1944).

<sup>5</sup>I note with the greatest of interest the announcement by several tire companies of the use of nylon fabric in the breaker (or overhead or insert) under the tread to distribute the shock loads which a tire experiences. This practice looks like a step in the right direction toward the elimination of stress concentrations in a tire by using a material with rubber-like elasticity as an intermediary between the rubber tread and the relatively inextensible carcass.

There are many other questions such as dimensional stability, ease of dyeing, finishing, etc., which must be answered before all the problems are solved and before the man-made fiber completely replaces the product of nature. It must be remembered that while man is constantly experimenting and improving, nature is also constantly making changes and nowadays, aided and abetted by man, is also making improvement in her product. Above all, to an industry such as yours, looms the question of availability at an economic price.

### Fibers for Rubber Industry

This brings us to a discussion of the question of which of these fibers are available to the rubber industry. Let us limit ourselves to a discussion of those products which employ textile materials as the strength member embedded in rubber products that must withstand repeated stressing, flexing, and subjection to elevated temperatures. Let us omit from our discussion such subjects as coated and proofed fabrics, liners, Holland cloth, etc. We will not omit tire cord because there is no sharp line of demarcation between tire cord on the one hand and belt cord on the other hand. Nor will we omit fire hose, even though there is no intimate intertwining of rubber and textile product in fire hose.

The answer to the question is that all these fibers, both natural and man-made, are available to you to use wherever you can find suitable economic justification. In many cases the problem of availability will rule out immediate consideration of certain fibers. In many other cases your peculiar requirements will eliminate others.

First and foremost among these requirements I place compatibility. Tires, belts, hose, are not rubber products only; they are skillfully blended, compounded, and constructed structures incorporating many kinds of rubber compounds, textile yarns as such, and fabrics—as well as steel wire (in tires). One fundamental rule of all engineering must never be overlooked—there must be no sharp stress concentrations; the elastic properties of the textile yarn or fabric must be so chosen that there is no infinite stress concentration at the interface between the textile product and the rubber in which it floats.<sup>5</sup>

Since it is impossible to avoid stress concentrations at the rubber-textile interface completely, it is necessary to provide for adequate adhesion. The adhesion between natural rubber and cotton tire cord has long been taken as the standard of adequacy. With the advent of the man-made fibers, particularly rayon, and the synthetic rubbers it has become necessary to make intensive investigation of the adhesion between the rubber and the textile product. Many intermediate products have been developed for use as adhesives, most of them not being adhesive at all in the common sense of the word. These developments have emphasized that the adhesion must be studied for each combination of textile fiber and synthetic rubber, that there is no universal adhesive for all products.

A newer discriminatory study of the mechanism of this adhesion has also been under way for some time. Whereas it used to be thought that the adhesion of natural rubber to cotton was a mechanical bonding due to the inherent fuzziness of the cotton cord, the newer developments have pretty largely forced abandonment of this concept. The adhesion of synthetic rubbers to cotton tire cord is certainly not so great as the adhesion of natural rubber although the fuzziness remains the same; likewise staple rayon cord is as fuzzy as staple cotton cord, but the adhesion of staple rayon to natural rubber is of the same order of magnitude as the adhe-

sion of continuous filament rayon. It may be that the explanation of the bond lies in the hydrophobic nature of the surface of greige cotton fibers, and the hydrophilic nature of the surface of the rayons, nylon, etc.

This question of adhesion is a problem of interest also to the textile manufacturer. Since human nature is what it is, the producer of the yarn or fabric usually gets blamed when the product fails because he is physically too far away from the scene to enter into the discussion until too late.

I do not claim that the cord did not break when the tire blew out; I do not say that the cord or the fabric did not fail when the belt broke. I do suggest that if the damaged product be examined not at the site of the local failure, but further away for signs of incipient failure, in many, if not most cases it will be found that the failure started in separation of the rubber from the cord or even in separation of plies of rubber from each other.

A second important requirement of the rubber industry for its textile products is dimensional stability. Tires and belts operate under such variable conditions of moisture that the fabrics must be insensitive dimensionally to moisture content. This problem is not unique altogether to the rubber industry, as we have the problem of dimensional stability in clothing fabrics as well. However it is especially aggravated under the conditions of repetitive stresses and flexing of such products as tires and belts. The present-day wet twisted cotton tire cord which was pioneered by one of the independent textile manufacturers is highly insensitive in its physical characteristics to changes in moisture content. In the main, however, the problem of dimensional stability rests largely with the rubber processor because the textile supplier has so little with which to work. Do not forget that high polymeric materials are justly inherently unstable.

A third requirement of the rubber industry is elasticity or the ability to recover from deformation almost completely. In this respect the conventional load-elongation curve cannot be trusted very far. It is requisite that one subject the material to mechanical conditioning—several cycles of repeated loading and unloading below the rupture point. If the material settles down to a steady state after a reasonable conditioning cycle, and the loading-unloading curves retrace themselves, then that textile material will be of use to the rubber industry. If a steady state is not reached, and if the loop does not close, then you will be plagued with growth of the tire or the belt.

Probably the oldest and still the most commonly measured property of textile materials is strength, and the cry is always "give us more strength." I wonder if strength or tenacity is not greatly overrated as a criterion of usefulness—not only in the rubber industry, but elsewhere. I wonder if in our obsession with strength measurements we are not overlooking other more obscure and less easily measured properties which may be associated with, but not necessarily dependent upon tensile strength.

Let me review the history of the tire cord for example. The early manufacturers of pneumatic tires apparently required high tensile strength to resist the air pressures used. Turning to cotton fabric which was the only material available with the necessary strength combined with the required pliability, they demanded and got fabrics made from combed Sea Island cotton. When Sea Island disappeared, the manufacturers demanded and got fabrics made from combed Egyptian cotton. Some daring rugged individualist tried American Upland cotton, and when the cord tire was fairly well developed, there was an almost complete switchover in

this country at least from the long Egyptian to long American cotton. As the cord tire has developed, there has been a continual decrease in the staple strength of the cotton used (and according to customary thinking, a decrease in the strength of the cord). Yet we have seen with all this decrease in the apparent quality of the cotton used an increase in the quality of the tires being built as evidenced by that one and only trustworthy criterion—performance on the road.

Another illustrative example about tenacity: according to the figures which I cited earlier, the cotton fiber is stronger than the high-tenacity rayon; yet, according to the published figures and the statements signed by a majority of the tire producers, rayon makes a better tire cord than cotton. The figures quoted are from authoritative sources. Has tenacity of the ultimate element any real significance in connection with tire performance? Or could it be that the tire engineer can better utilize the strength of the rayon filament than he can the strength of the cotton fiber?

There is another element, *toughness and resiliency*—the ability of the material to withstand and to recover from repeated applications of stress far below the ultimate breaking point. It will require more serious attention to the repeated loading-unloading curve under the conditions of temperature and moisture similar to those prevailing in use to decide this point, but I suggest that the utility of a textile fiber for use in industrial rubber products is determined by its resiliency under the conditions of use than by its tenacity at normal textile laboratory conditions of temperature and moisture.

Finally a peculiar requirement of the rubber industry which is not met with in other uses of textile products and indeed is not always met with in the rubber industry is *heat resistance*. The textile material must withstand not only the temperatures developed by the product in service, temperatures which approach, if not reach the vulcanizing temperature of rubber, but the temperatures experienced during the vulcanization process itself. Cotton and rayon being both cellulose, will deteriorate under the action of heat similarly except as the one is protected from associated degrading conditions better than the other. The fibers made from thermoplastic products must be used with the greatest of caution, even those which apparently have melting or softening temperatures well above the temperatures experienced in vulcanizing or service conditions of the rubber products.

Although heat deterioration is commonly measured by loss in tensile strength, I believe I have seen figures to indicate that serious heat degradation may occur without any apparent loss in tensile strength. I refer to tests made on cords from worn-out tires, tests which indicated no loss in strength, but almost complete loss in other properties such as high-temperature fatigue resistance.

I have also seen figures which indicated another type of loss-test on cords removed from the product. These tests indicated no loss in tensile strength, but indicated that all lengths which were broken broke at one particular place. When the cords were examined in the light of location on the complete product (the tire), it was found that the failures were all occurring at what might be termed a hinge in the tire—a section of the carcass which, owing to faulty design, was receiving all the flexing.

There are other peculiar requirements to your industry, requirements which are little understood particularly by the textile manufacturer because they occur in no other end-use. One of these requirements is the use of twist and the peculiar combinations of twist which you require. Normally the textile manufacturer introduces

as few twisting operations as necessary and puts in twist to achieve maximum strength or to achieve some special decorative effect. Consequently the requirements of the rubber manufacturer for tire cord and belt cord are hard to understand. Why when strength is so much a requirement, do you insert the twist which you do into cotton tire cord and even into rayon tire cord? If strength is the requirement, why do you introduce into continuous filament rayon any more twist than is just sufficient to form a coherent structure? Why not make the cotton tire cord out of a plied yarn or even a singles yarn twisted to maximum tensile strength?

I believe you have found that strength is not the only requirement. I believe you have found that a certain amount of twist is necessary, even to the extent of sacrificing tensile strength, because your products operate in compression as well as in tension. There must be sufficient twist to permit the yarn or cord to act as a unit in compression to prevent excessive stresses at the rubber-textile interface—the cord must act as a spring. This is a form factor which experience has found necessary to introduce even at a sacrifice of what seems to be required properties.

In other instances we can understand that the yarn or cord is not subjected to compressive stresses, and therefore we can manufacture to maximum strength, that is without so much twist. But in conveyor belts and in fabric V-belts are not the underlayers of fabric subjected to longitudinal compressive stresses? In duck for conveyor belting should not some consideration be given to requirements similar to tire cord requirements, and the warp yarns manufactured in the light of these compressive stress requirements? In conveyor belting what is the purpose of the filling yarns? What kind of stresses do they experience? If no particular stresses are experienced, do we need such strong fabric weft-wise? If the conveyor belt is required to withstand shock loading such as the dumping of rock and coal, should not the filling yarns be designed to be shock resistant, that is tough, instead of merely strong?

#### **Better Cooperation between Textile Producer and Consumer Needed**

What I am leading up to is that the textile manufacturer has had considerable experience in putting together different types of yarns for different services. If he understands your problems—and he can only understand them by you telling him your requirements and why you have these requirements—he can probably construct for you fabric more suited to your purpose than he is now delivering to you. But if you tell him that you must have strength when obviously you are making specifications which will not deliver the maximum strength available, he is naturally curious as to why you have such specifications. It is only by cooperation and mutual interchange of information with respect to our common problems that we make progress.

In two other respects is close cooperation between the supplier and the consumer necessary. The first of these is methods of testing and tolerances. In order to establish and maintain specifications, standard test procedures must be established, and tolerances agreed upon. Before any property of the yarn or fabric can be specified it is necessary first to define the property, then to establish a method of testing this property, and finally to decide what shall be the permissible variations from the established standard. When one is dealing with such highly variable materials as textile yarns and fabrics, intelligent tolerances on any specification are necessary. Also since most textile products are sensitive to mois-

ture content, it is necessary to make the measurements at an established relative humidity or moisture content. It is not easy, in a routine test laboratory, to bring the moisture content of each and every sample to exactly any particular specified value. However it should be possible for each and every laboratory to establish a common laboratory atmospheric humidity and to condition every sample for any prescribed period of time before testing.

There is an established organization where supplier and consumer can meet together and discuss their mutual problems with respect to testing—Committee D-13 of the American Society for Testing Materials. Procedures and standards have been established by this Society for testing and for specifications which the products must meet. Since the textile manufacturer supplies yarns and fabrics for many different consumers, he must have reference conditions on which to base the properties of the materials he manufactures. He cannot change his laboratory conditions to meet the whim or fancy of every individual consumer. He can, although it is expensive, change his product to meet each individual specification. Therefore he must ask that you, the consumer, abide by these almost universally recognized standards of test methods and specifications. If the standards are not satisfactory or are inadequate, the proper place to make the change is in Committee D-13 in open discussion. Standards can be developed because standards have been developed—not pseudo standards designed to befuddle an already confused public, but intelligent standards which incorporate the needs and requirements of the consumer as well as the manufacturing limitations of the supplier.

The second place where closer cooperation between consumer and supplier is needed is in the standardization of specifications on mass production products. In order that production be on a mass-production scale, thousands, no millions, of yards of fabric must roll off the looms, each yard of which is identical with every other yard within manufacturing tolerances. Much was accomplished during the recent war years toward this standardization. Although the demands of our wartime activities have ceased, the need of standardization is still present, and it has been shown that we can standardize on mass-production items.

Certainly let us raise our quality standards from those prevailing during the war years if such raises are necessary. But it will be of benefit both to the supplier and to the user if we have a limited number of weights and widths of fabric to manufacture. Specialty items should be specified only when there is definite need of departure from the standard. After all, history has pretty well demonstrated that the major improvements in mechanical rubber goods are due to improvements in the art of fabrication rather than in basic changes in the raw materials.

#### **Summary and Conclusions**

In summary then: there are many fibers available today, many more than were available a few years ago. Each individual fiber has advantages and unique properties, but each fiber has serious disadvantages and marked deficiencies. Difficulties must be overcome not only in the processing of these fibers into yarns and fabrics, but also in the fabrication into rubber goods. It is only by intelligent and cooperative research that we can put each fiber to use most advantageously and most economically. The enormous advances made along certain lines in the last few years have shown us that great progress can be made through organized correlated research activity.

(Continued on page 219)

# Aging and Preservation of Vulcanized Rubber—II

## A Study of Factors Affecting Aging Deterioration of Vulcanized Rubber, Methods for Evaluating and Means of Preservation

Gerald Reinsmith<sup>2</sup>

**J**OHNSON and Scott (68)<sup>3</sup> aged four red inner tubes (antimony sulfide filler) of different makes at 32° C. and at 13° C. in subdued daylight during two years, and in the Geer oven, and observed that the relative rates of deterioration were not the same. Changes due to oxidation and hardening, however, were similar. In general, one day in the Geer oven was roughly equivalent to nine weeks at 32° C., and 14 weeks at 13° C.; the results at the higher temperature were more consistent. The increase in weight or density due to absorption of oxygen is approximately related to mechanical deterioration measured as loss in tensile strength. The Geer test is not generally reliable for predictions of the behavior of vulcanized goods during storage except, perhaps, in comparative tests of closely similar types of goods. Acetone extract and measurement of elongation at definite stress are not recommended as indices of mechanical deterioration. Stevens and Gami (69), working with latex-coated cotton fabrics, observed an initially slow but rapidly mounting increase in acetone extract after several days in daylight, or ultra-violet, or at 70° C.; there was no deterioration in the dark. Some common types of aryl amines were effective antioxidants.

Buist and Welding (70) point out that the most obvious limitation to the use of accelerated aging tests as a guide to natural aging is that the main cause of failure in service must be known. For example, GR-S compounds fail from atmospheric cracking in certain applications, but tests in the Geer oven or the oxygen bomb will give no indication of their endurance. Thus it is essential to distinguish clearly between the various types of changes as shown in Table 1, which may occur as a result of aging.

### Chemical Solution as Preservatives

The application of solutions of chemicals as preservatives to the surfaces of vulcanized rubber goods has been recommended by a number of investigators. The compounds thus applied vary from inorganic alkalis to phenols and aromatic amines. Thus, one author (71) washed goods in soda soap and immersed them into ammonium carbonate solutions, but preferred applications of carbolic acid or creosote solutions. Dipping into solutions of alkalis is said to prevent hardening (72). Ammonia, and alkalis, phenols, paraffin, and petroleum vapors are reported (73) to have preservative properties. Stowe (74) applied a 10% solution of ammonia containing sodium phenolate or oleate to prevent oxidation; while Whitby (75) and Coester (76) recommended phenols for this purpose.

The most extensive studies of the application of phenols to vulcanized rubber for purposes of pre-

Effect	Mechanism	Favorable Aging Conditions	Rubbers Particularly Susceptible
Shallow Surface Changes			
Skin formation and crazing	Attack by oxygen or possibly vulcanization catalyzed by light	Exposure to light	Most rubbers
Discoloration		Unstretched samples in humid ozonized air	
Frosting		Ozone + moisture	
Chalking	Any surface breakdown	Depends on the particular cause	
Deep Surface Changes			
Atmospheric cracking	Attack by atmospheric oxidizing agents such as ozone	Exposure of stretched samples to outdoor atmosphere or ozone, shaded from direct light	Natural rubber, GR-S, Perbunan
Surface hardening or softening	Surface oxidation at high temperatures	Oxygen bomb, oven aging at 70° C. or above	All rubbers
Changes Throughout the Rubber			
Loss of strength	Uniform oxidation	Aging at room temperature (oven or bomb aging)	Natural rubber, GR-S, Perbunan
Hardening	Probably oxidation, but may be continued cure or polymerization		Natural rubber, GR-S, Perbunan
Softening			Natural rubber, Butyl

In general, several of the above effects will occur simultaneously and may interact with one another.

\* Taken from article by Buist and Welding, *Trans. Inst. Rubber Ind.*, 21, 49 (1945).

servation are those of Moureau, Dufraisse, and Lotte (77), who claim remarkable preserving effects from applications of solutions of polyhydric phenols in solvents. Semon, Sloan, and Craig (78), however, in attempting to evaluate any advantages of surface applications of age resisters to cured rubber obtained results at variance with those of Moureau *et al.* (77). They concluded that phenols are comparatively weak in their action and cited bis-arylamino-p-phenylenediamines, thiodiphenylamine, and p-hydroxydiphenylamine as being the most active. An editorial (79) commenting on these papers (77, 78) is interesting, but of little value. Historically, the first substances found to exert a specific retarding action without an accelerating effect i.e., to function as antioxidants, were probably tannic acid and hydroquinone (80). Delbruck and Meisenberg (81) used tannin in synthetic rubber to prevent oxidation and tackiness.

The amines recommended by Semon, Sloan, and Craig (78) have been listed above. Cadwell (82) applied solutions of diphenylnitrosamine, p-aminophenol hydrochloride, and aldehyde-amines to the surfaces of cured articles. Ostwald and Ostwald (83) effect preservation by painting, swelling, or spraying with solutions of "neutral and basic aromatic nitrogen compounds, neutral or basic heterocyclic substances and alkaloids, either alone or mixed." Martin (84) applied

<sup>1</sup> The opinions or assertions contained herein are the author's and are not to be construed as official or reflecting the views of the War Department.

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<sup>3</sup> Numbers in parenthesis refer to the literature references at the end of this installment.

mixtures of aniline or similar amines with cottonseed oil or glycerine to extend the useful life of tires and hose. Benjamin (85) painted benzene solutions of aniline and alkaloids on rubber articles to prevent oxidation.

According to Bayer & Co. (86), aliphatic amines, ammonia, or alkalis prevent deterioration of synthetic rubber (butadiene polymers), and tannin, ammonia, dimethylamine, and dimethylaniline prevent tackiness (87). Fiedler (88) painted rubber articles with mixtures of phenylhydrazine and glucose, or of glycerine and benzaldehyde, alone or incorporated into rubber cements. Bayer & Co. (89) used ammonia, methylamine, piperidine, and other volatile amines in balloon gases to prevent deterioration of the envelope. Ammonia, phenol, or glycerine is frequently mentioned as preservatives, and Beyer (90) employed treatments with aqueous emulsions of terpineol, glycerine, gum tragacanth, or aniline. Larine (91) immersed the articles directly into aniline, phenol, or glycerine. Ritter (92), on the other hand, claims that rubber is softened and rendered more susceptible to oxidation by aniline or hydrazine and considers preservation in water the most convenient. Hydroxy and nitro compounds behaved as antioxidants in the Bayer & Co. synthetics (93). Dipping into benzene-alcohol solutions of antioxidants is a recommended procedure (94).

The application of paraffin or paraffin oils for preserving cured rubber articles was an early development (95). Estruch Diaz de Lara (96) used a mixture of vaseline and paraffin as a preservative lubricant for rubber; while Mikhaylorskii (97) covered the goods with naphthalene powder. According to Burbridge (98), using mineral oils, vaseline, ceresin wax, and fatty oils as softeners improves the aging resistance of the rubber. Ahrens (99), however, feels that coating rubber with vaseline or ceresin is not practical; while an anonymous author (100) warns against contacting rubber with fats or essential oils. Camille (101) claims that cottonseed and palm oils effect oxidation and rapid deterioration, but Chertoff (102) uses pine, rosin, or palm oils, or turpentine to prevent deterioration. Ceresin is frequently recommended as a preservative (103); Grossman (104) applied coatings of ceresin or vaseline to prevent oxidation by excluding air, but found that these materials deteriorate rubber.

In an old lecture by Bolas (105) oxidation is said to be accelerated by heat and fat; to the latter, however, he also attributes a retarding action due to its effectiveness in excluding oxygen. Himmelbauer & Co. (106) used coatings of vaseline or ceresin as preservatives.

The use of glycerine, alone or admixed with other materials, as a preservative for rubber is mentioned frequently. Schidrowitz (107) used glycerine alone. Kurtz (108) employs a mixture of glycerol and drying oil to preserve the surfaces of air bags. Thierfelder and Schmaelzle (109) propose a mess composed of tar, pitch, resins, rubber cement, fish glue, and glycerine for preserving tire treads. Bevington (47) stores articles according to prescribed directions and then occasionally coats them with glycerine. Braunwarth (110), after three years' storage, carefully kneaded and stretched the stored goods and then applied 5% ammonia and 5% glycerine successively at 40° C. Glycerine is said to resist aging; while oils, fats, and heat cause poor aging (111). Jewett used a coating of corn syrup and glycerine (112).

Numerous other mixtures, many of them of dubious composition and quality, have been recommended as preservatives. Clarke (113) coats with a water paste consisting of china clay, chrome yellow, and soft soap

in order to exclude light from the rubber. A mixture by Swift (114) exceeds this in components: linseed oil, rosin, manganese dioxide, and coal tar and petroleum naphthas are heated together (manganese resinate may be added) to produce a preservative dressing for tire treads. Kirchhof (115) used mixtures of ozocerite (amine or naphthylamine products of varying composition) as antioxidant and plasticizing compositions to prevent aging of vulcanized rubber. A mixture obtained by heating castor oil with potash or lime is also recommended (116).

Various naturally occurring materials have not been excluded from these applications. Zertuche (117) claims the juices of mesquite and other desert shrubs as preservatives, and Hutchinson (118) uses acid-free wool cholesterol to prevent oxidation and tackiness. The use of citrus pectate pulp in the packaging of synthetic rubber is not as a preservative, but simply as a coating to prevent the rubber from sticking to the paper containers (119).

Rubber thread, according to Bradley (120), is protected from oxidation by using lamp black and ceresin; Wattles (121) treats it with acetic acid to form a surface glaze and prevent decay. Among inorganic materials, lime and magnesia apparently cause poor aging (122). Saturated boric acid or 1% solutions of formaldehyde or zinc chloride have been recommended as preservatives (123).

Antioxidant coatings, by virtue of their function, are gradually consumed and would have to be renewed; and any break in a protective coating is a potential source for the spread of oxidative deterioration from that point.

### Solid Dehydrating Agents and Absorbents

The use of solid dehydrating agents has been mentioned (124). Recommendations have been made that absorbents like lead salts and lime be placed into packages containing synthetic rubbers to absorb such gases as hydrogen sulfide, hydrogen chloride, and oxygen which may diffuse from the surfaces of the rubbers. Thal (125) used ammonium carbonate. Ammonia, ammonium carbonate, caustic soda, glycerine, sodium soaps, phenols, cresols, and paraffin have been used to prevent aging (126). Dunlop Rubber Co., Ltd., (127) preserves the white color of articles, as golf balls coated with paint or enamel, by packing in the presence of acidic substances such as zinc sulfate or phosphorus pentoxide to remove any basic vapors emanating from the articles or wrappers.

### Inert Atmospheres and Liquid Preservatives

Most investigators are in agreement that air, light, heat, and oil speed the deterioration of rubber, and directions for preservation, when available, are usually designed to avoid the destructive influence of these agents (92, 104, 128). Inert atmospheres, moisture, and low temperatures are frequently recommended, although some writers caution against cold, and one (129) prefers a moist cellar at 12-16° C. Storage in *vacuo*, total immersions (as in water), and chemical means, such as gas absorbents and dehydrating agents, have all been recommended (130).

The cautions against oil are interesting in view of the preserving effect ascribed to hydrocarbon vapors by some authors. Stevens (39) claims similar marked effects for kerosene vapors and moist air, which presumably protect the rubber from oxidative decomposition, since the acetone extract does not increase. Young (131) describes the experience of British surgeons in

India who found that an atmosphere containing kerosene vapor kept rubber goods soft and pliable. Their storage cabinet was a tightly closed tin broad box fitted with trays and containing a few spoonfuls of oil on the bottom. Hempel (132) used petroleum vapors in a similar manner and also carbon dioxide atmospheres. The use of vaseline, mineral oils, paraffin, and solid naphthalene as preparative applications has already been mentioned.

Bevington (47) on the other hand, warns against oil, heat, and dry air. He recommends storage in cold and dampness in the absence of air and light. For long-term storage he soaks the articles during several days in dilute ammonia and finally immerses them in boiled water containing 1-2% of phenol, using glass vessels and avoiding kinks in the goods. Graichen (133) stored thin rubber articles by immersing them into an aqueous solution of borax and glycerol; by this procedure the rubber is said to retain its strength and elasticity, and secondary vulcanization is prevented. The longest recorded immersion is in a footnote (39) by Stevens who says he has been informed that rubber stoppers have been preserved in water for 30 years. Barclay (134) preserved rubber springs (for steam hammers) by submersion in water. An unknown author (44) preserved rubber tubing under water, lime water, 1% caustic soda solution, or 10% glycerine. Glycerine is both recommended and seriously questioned for the storage of tires.

For inert atmospheres, carbon dioxide is the most generally preferred gas. The Ajax Rubber Co. (124) stored rubber articles in containers filled with carbon dioxide, neon, nitrogen, or argon alone or in the presence of such dehydrating agents as calcium chloride, sodium chloride, calcium sulfate, or sodium carbonate. Elworthy (135) prescribes an oxygen-free atmosphere. According to Braunwarth (110), rubber articles stored in airtight, zinc-lined containers at 12-18° C. remain elastic for three years. In this connection the possibility of using zinc seats for rubber-containing gaskets required for sealing some types of storage containers may be considered. Gorter (136) observed that rubber sealed in tubes with hydrogen or carbon dioxide does not become tacky. Stevens (137) stored articles in moist air; Johansen, however, (138) used an atmosphere of ammonia.

### Products of Deterioration and Suggested Treatments

The products of decomposition of vulcanized rubber resemble those of raw rubber in properties and composition.

The preference for carbon dioxide rather than nitrogen as a storage medium because of a hardening effect which the latter may have on vulcanized rubber is not without difficulties. Under proper conditions carbon dioxide may act as an oxidizing agent, and Bruni (139) has found that vulcanized rubber in the presence of light and carbon dioxide does effect some reduction of the latter to carbon monoxide.

The formation of progressively increasing amounts of sulfuric acid during the aging of vulcanized rubber goods has been observed by a number of investigators. Spence (57) demonstrated experimentally that sulfuric acid produces tackiness without changing the overall composition of the rubber and concluded that the action of oxygen is indirect. The obvious mechanism is the oxidation of sulfur and organic and inorganic sulfides by air, especially in the presence of copper or copper salts. Bing (40) showed that copper chloride is a strong promoter of sulfuric acid formation and consequent de-

terioration in vulcanized rubber. The free sulfuric acid content of old hardened samples was highest in those containing the smallest amounts of copper or lead salts, presumably because of less sulfate formation. Insulators of hard rubber (ebonite) frequently undergo a drop in electrical resistance because of the formation of free sulfuric acid on their surfaces (140, 141). Burghardt (142) discussed the oxidation of excess sulfur to sulfuric acid during rubber manufacture, and Eaton and Day (143) showed that sulfur trioxide is formed during the deterioration of vulcanized rubber. Frank (144) considered the formation of sulfuric acid by the oxidation of sulfur in rubberized balloon fabrics in the presence of light and metal salts and suggested the use of protective pigments as preventatives. Wright (145) observed that ozone oxidizes sulfur in vulcanized rubber to sulfurous and sulfuric acids. Muntz (146) encountered these products as results of ordinary oxidation and proposed to prevent their deleterious action on fabrics by additions of lime, barium hydroxide, or ammonium carbonate. Camille (147) noted the oxidation of excess sulfur to sulfuric acid.

Burghardt (148) considered an excess of sulfur detrimental and found that the action of hot aqueous alkalis produced rubber surfaces which aged rapidly. Foden (149) noticed the lime caused poor aging. Heinzerling (150) observed poor aging in rubber containing mineral pigments and found the action of alkalis negligible. Paraffin retarded aging, but increased the heat susceptibility. A 5% solution of caustic soda at 40° has been recommended to soften hardened rubber stoppers (151). Bierer and Davis (55) report that, in their oxygen-bomb test the presence of sulfuric acid and especially of manganese and copper compounds increases deterioration enormously, as in natural aging. On the other hand, it is claimed (152) that manganous sulfide improves toughness and aging.

The use of aniline to soften hardened rubber articles has been recommended by several authors and may be due partially to salt formation with the small amounts of free sulfuric acid present. For this purpose Martin (153) used a solution of aniline in cottonseed oil; whereas Ahrens (154) employed aniline, benzene, petroleum, and other solvents to restore hardened rubber and concluded that the effect lasted only as long as the solvent was present. According to Ostromislensky (155), aniline is an age retarder of vulcanized rubber.

### Conclusions

1. Most data available indicates that oxygen is the greatest natural enemy of rubber and that deterioration is accelerated by increased temperature and energized by sunlight.
2. Disagreement exists as to the effectiveness of applying chemicals as preservatives, as to the most effective inert atmosphere with doubt being cast on the use of carbon dioxide, and as to the best temperature for storage except that a universal preference for a relatively low temperature is expressed.
3. Most investigators are in agreement that vulcanized rubber cures further on aging and that storage in damp atmosphere tends to retard oxidation.
4. Under- or over-vulcanized rubber deteriorates more rapidly, and using strong accelerators improves the aging properties due to less depolymerization.
5. The velocity of hardening in light varies directly with the temperature and inversely with the wave length.
6. Ozone has a pronounced effect on stressed parts.
7. When storing rubbers the following must be considered:

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(79) J.  
(80) H.  
(81) U.  
(82) N.  
(83) G.  
(84) U.  
(85) J.  
(86) C.  
(87) G.  
(88) U.  
(89) K.  
(90) J.  
(91) J.  
(92) B.  
(93) R.  
(94) N.  
(95) K.

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- a. Protection from oxygen and sunlight (total darkness) should be provided.
- b. All stresses and strains should be relieved.
- c. The parts should be thoroughly cleaned before storing (use soap and water).
- d. Grease and oil should not be in contact with the rubber.
- e. A low temperature is preferred.
- f. Metal contacts should be avoided.
- g. A static inert atmosphere (nitrogen) is desirable.
- h. Maximum humidity is beneficial.
- i. Solid absorbents for corrosive gases may be provided (avoid contact with goods).

8. Satisfactory examples of long-term storage of rubber articles are lacking.

9. Accelerated aging tests do not agree in relative rates of deterioration of different rubbers to the extent that different order of merit may be indicated.

10. In conducting both natural and accelerated aging it is essential that the different changes which may occur be distinguished and tested separately if a true evaluation is to be made.

11. In testing at a high temperature such as in an oven or bomb, the absorption of oxygen is so rapid in relation to the rate of diffusion as to permit penetration only to a small depth before being absorbed. The specimens are, therefore, heterogeneous, and several deficiencies in measurement of physical properties result. A lower temperature should give more uniform results.

12. Tests in the oxygen bomb are less heterogeneous at a specified degree of degradation and are therefore preferable (not considering less time required than in an oven at the same temperature).

13. At least two physical properties should be measured following oven or bomb aging to insure an accurate evaluation of degradation.

14. The following distinct changes take place on lowering the temperature of rubber:

- a. Simple temperature effects
- b. Second-order transitions (vitrification)
- c. Crystallization (first-order transition), and
- d. Plasticizer effects.

15. A more fundamental knowledge of the aging of rubber and factors effecting it is needed to provide a basis for answering questions of practical importance such as the efficacy of preservatives, best conditions of storage, economic value of special conditioning equipment, etc.

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# Measurement of the Scorch and Cure Rate of Vulcanizable Mixtures Using the Mooney Plastometer<sup>1</sup>

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and J. H. Musch<sup>4</sup>

**T**HE scorch rate of a vulcanizable mixture is considered to be measured by the time required for the earliest manifestations of vulcanization to appear as the result of heating at a low temperature in the range in which processing operations are carried out. The cure rate is considered to be measured by the time required to develop certain properties of the mixture as the result of curing at normal vulcanization temperatures. Thus the scorching time involves the early portion of the heating period (at a low temperature), while the curing rate usually involves the succeeding portion (at a high temperature). While determinations of these rates are usually made at different temperatures, there is no good reason why both should not be determined at the same temperature if (a) a sufficiently precise method were available, and (b) if the temperature coefficients of both processes, over the temperature range involved, are known.

Many methods for measuring the scorching rate of rubber and synthetic rubber compositions have been proposed. Most of the methods depend on heating a series of samples for various time intervals and measuring the changes occurring in certain of the physical properties. For example, Thies<sup>5</sup> suggested heating pellets for varying periods of time in suitable liquids and determining the time of heating required for the pellet to become insoluble in a solvent such as benzene. Twiss and Jones<sup>4</sup> somewhat similarly heated pellets (at three temperatures) for various periods of time and estimated the degree of cure by feeling the pellets from time to time with a rod. A common method is to cure tensile sheets for various times at low temperatures (usually in the range of 220 to 260° F.) and determine the stress-strain characteristics. Nearly all the methods for measuring plasticity in rubber have been suggested at one time or another for determining scorching rate.<sup>5</sup> The most popular of these, judging from the recent literature, is the determination of the plasticity by the Williams<sup>6</sup> method after various periods of heating in an air oven.<sup>7</sup>

In 1941, Weaver<sup>8</sup> suggested the use of the Mooney plastometer for this purpose. He defined the scorch time as the time required for the plasticity to reach a value of 100 (on the Mooney scale) and presented data showing a close relation between this time and the curing rate at vulcanization temperatures. He recommended a test temperature of 250° F. as being most suitable.

The determination of curing rate is most commonly done by measuring the stress-strain properties over a series of cures and noting the rate at which modulus and tensile strength develop with time of heating.

It was the purpose of the work reported here to determine whether or not measurements of both scorching rate and curing rate can be made at the same temperature using the Mooney plastometer and to determine the temperature coefficients of these two parts of the curing process over a range of temperatures which would include both processing and curing temperatures.

## Method of Test

All the Mooney cure<sup>9</sup> tests were made on a machine equipped for steam heating and with the necessary controls so that temperatures in the range of 212 to 335° F. could be attained. For temperatures lower than 212° F. an auxiliary hot water system was used. The apparatus departs from the standard machine in that the platens were modified by plugging the thermometer and regulator wells and drilling additional channels to provide steam space as near to the dies as possible. No thermometers were used in the platens. Instead special thermocouple junctions were made to replace the two plungers, and a portable potentiometer was used for taking the temperature readings of the specimen. A thermometer in the exhaust steam line was used for checking the platen temperature.

The small rotor was used in all tests reported herein in order to avoid excessively high torques which might have been encountered with the large rotor. Before or between tests the rotor was placed in an inverted position on the top platen to maintain its temperature as nearly as possible at the platen temperature.

All the samples were conditioned for a minimum of one week in a room maintained at 82° F. and 45% relative humidity. This practice was adopted because previous experience with this test had shown that it was necessary to control the moisture content of the uncured stocks if duplicable and consistent results were to be expected.

The procedure used in running a test was as follows:

The temperature of the machine was regulated to the desired level with the dies in the closed position. The temperature was checked by means of the thermocouples in the die cavity and by the thermometer in the exhaust steam line.

The samples used were in the form of two- by two- by ¼-inch blocks cut from slabs four- by six- by ¼-inch. A ⅜-inch hole to accommodate the rotor stem was punched in one of the blocks. Duplicate tests were run at each temperature, and the averages used. If these failed to agree within 0.5-minute, a third test was made.

Two operators were required in order to take both the plasticity readings and the temperature readings. One operator

<sup>1</sup> Presented before the Division of Rubber Chemistry, A.C.S., Cleveland, O., May 28, 1947.

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<sup>12</sup> Since the degree of cure attained at the end of a typical test is well beyond the "scorch" stage, we prefer the term "Mooney cure" rather than "Mooney scorch" for the test.

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MOONEY PLASTICITY

started the test by opening the machine, quickly inserting the hot rotor through the hole in one of the samples and placing it in position in the lower die. The second sample was placed on top of the rotor, and the dies were closed. Timing was started by means of a stop watch at the instant the dies were closed. The temperature was read at this point and at 30-second intervals thereafter. After a one-minute warm-up the rotor was started. This one-minute period is included in the total test time. The initial maximum reading is recorded and the readings at each 30-second interval following. The dial reading recorded is the minimum reading occurring in the period from 15 seconds before to 15-seconds after the specified reading time except when the plasticity is rapidly increasing. This practice eliminates the effect of needle drift.

The test was continued in each case until the plasticity value had increased at least 30 points above the minimum value observed.

A set of six compounds was made up for testing, based on natural rubber, GR-S, GR-I, and Hycar OR-15. The formulae used are given in Table 1. Mooney cures were run on each compound at five or six different temperatures with approximately 10° F. increments, so selected that cure would occur in a reasonable length of time at the lowest temperature.

TABLE 1

	A	B	C	D	E	F
GR-S	100.	100.				
Hycar OR-15			100.			
#1 ribbed smoked sheets				100.	100.	
GR-I						
MPC Black		50.		20.	50.	
EPC Black			100.	30.		
SRF Black	95.					
Witecarb K <sup>1</sup>	20.	5.	5.	5.	5.	5.
Zinc oxide (French process)	10.	5.				
Extending resin <sup>2</sup>		1.5		2.	1.	
Stearic acid		5.				
Paralux <sup>3</sup>				3.		
Bayol D <sup>4</sup>					3.	
Tarene <sup>5</sup>			25.			
Dibutyl phthalate					1.	1.
Phenyl-beta-naphthylamine			1.			
Benzothiazyl disulfide				0.5	1.	0.6
2-Mercaptobenzothiazole	2.					
Diphenylguanidine	0.25	1.2				
Santocure <sup>6</sup>				1.		
Tetramethylthiuram disulfide				2.	3.	3.
Sulfur	3.	1.75	1.			
	230.25	164.45	232.	162.5	165.	110.6

<sup>1</sup> Pine precipitated CaCO<sub>3</sub>.

<sup>2</sup> Comarone-indene resin MP 205-257° F.

<sup>3</sup> Petroleum-type softener.

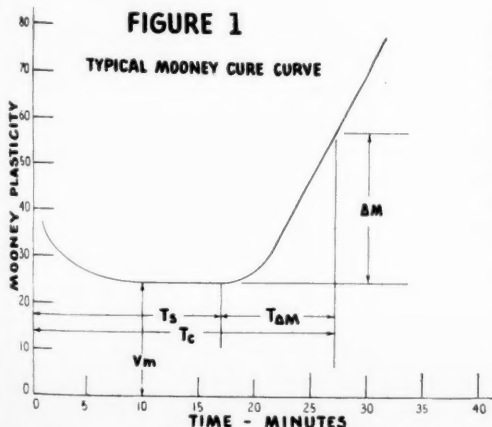
<sup>4</sup> Light mineral oil.

<sup>5</sup> Pine tar.

<sup>6</sup> N-Cyclohexyl-2-benzothiazolesulfenamide.

The cure data for each compound at the series of temperatures used were plotted along with the temperature readings which were taken simultaneously.

A typical curve obtained at one temperature is shown



in Figure 1. The measurements which we have used herein to characterize a Mooney cure curve are: the scorch point,  $T_s$  (defined here as the time of the last plasticity at the scorch point,  $V_m$ ), and the time required to reach a specified increase in plasticity over the minimum,  $T_{\Delta m}$ . The latter is used as a measure of the cure rate.

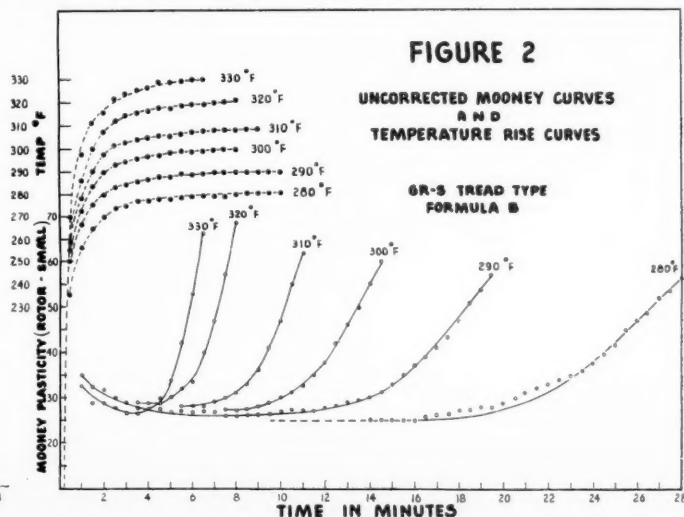
Our reason for selecting the time of the last plasticity reading preceding a consistent rise in plasticity as the scorch point is that immediately following this reading the first indication of cure is manifested. The use of the time required to reach a value of 100, as suggested by Weaver,<sup>8</sup> is objectionable for the reasons that this represents a fairly advanced state of cure and also that many of the compounds, particularly in the synthetics, will not reach a value of 100 owing to slippage of the rotor or tearing of the stock. In many cases the later readings in a Mooney cure test must be discarded because of this failure.

In Figure 2 a typical set of curves for the various test temperatures is shown for the GR-S tread stock.

The times required to reach the scorch point or to reach a specified increase in plasticity over the minimum for a series of cures at different temperatures cannot be used directly for determining the temperature coefficients of the two processes because of the time lag in heating the sample to the impressed temperature. The curing effect obtained during the heating period is not a constant proportion of the total curing time at the different temperatures. In each case this curing effect was calculated from the temperature rise curve on the assumption that the temperature coefficient was 2, i.e., that the cure rate doubled for an increase in curing temperature of 10° C. In Figure 3, three of the curves shown in Figure 2 are replotted along with the corrected curves obtained after this calculation.

This procedure is necessarily somewhat cumbersome and for routine work is unnecessary. Corrections based on measurements such as these may be used for subsequent tests on compounds which do not differ appreciably in thermal diffusivity, and for less precise work a fixed correction value could be used throughout. Because of the modifications made in the steam platens, the values for the correction factor, as found in this study, may be somewhat different than for other instruments not modified in this way or which are electrically heated.

With the use of this procedure, the scorch time and the time required to reach an additional 30 points above the minimum plasticity were scaled from the corrected



curves. Both the uncorrected and corrected values are given in Table 2. From the corrected values plotted on a logarithmic scale against temperature, the temperature coefficients were calculated. The temperature coefficient as used herein is the ratio of the time (of scorch or cure) at one temperature to the time at a temperature 18° F. (10° C.) higher. Typical curves for the GR-S tread stock are shown in Figure 4. The values for all the stock are given in Table 2.

TABLE 2. MOONEY CURE DATA

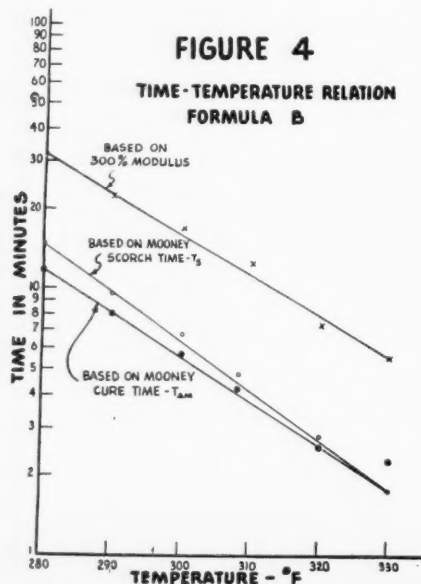
Compounds	Temp. °F.	T <sub>sc</sub> °F.	T <sub>sc</sub> Corrected	T <sub>c</sub> °F.	T <sub>c</sub> Corrected	T <sub>Δm</sub> °F.	Temperature Coefficient		
							Scorch	Cure	Overall
Formula A	190	19.5	18.3	40.0	38.8	20.5	2.3	2.3	2.3
	198	12.5	11.4	25.5	24.4	13.0			
	210	8.5	7.2	14.6	13.3	6.1			
	220	5.5	4.3	9.9	8.7	4.4			
Formula B	240	3.0	1.8	5.1	3.9	2.1	2.1	1.8	2.0
	280	16.0	14.5	27.8	26.3	11.8			
	290	11.3	9.5	19.3	17.5	8.0			
	300	8.5	6.8	14.2	12.5	5.7			
Formula C	308	6.5	4.8	10.7	9.0	4.2	2.3	1.8	2.1
	320	4.5	2.8	7.5	5.4	2.6			
	330	3.5	1.8	6.2	4.1	2.3			
	237	22.5	20.9	39.9	38.4	17.5			
Formula D	248	14.3	12.9	25.6	24.5	11.6	2.0	1.7	1.9
	257	8.5	6.9	17.6	16.1	9.2			
	266	6.0	4.4	15.2	13.7	9.3			
	278	5.0	3.4	9.6	7.8	4.4			
Formula E	287	3.5	1.9	6.4	4.9	3.0	2.1	2.0	2.0
	297	2.0	0.4	4.8	3.1	2.7			
	259	12.5	10.3	22.3	20.1	9.8			
	269	9.5	7.3	16.9	14.7	7.4			
Formula F	279	7.0	4.8	12.1	9.9	5.1	2.4	1.4	1.9
	287	5.5	3.3	9.6	7.4	4.1			
	297	4.0	1.8	7.2	5.0	3.2			
	305	4.0	1.8	6.1	3.9	2.1			
Formula G	316	3.0	0.8	5.2	3.0	2.2	2.1	2.0	2.0
	247	15.0	13.0	24.5	22.5	9.5			
	256	11.3	9.3	18.0	16.0	6.7			
	270	7.0	5.0	11.6	9.1	4.1			
Formula H	275	6.0	4.0	9.9	7.9	3.9	2.1	2.0	2.0
	288	4.0	2.0	6.6	4.4	2.4			
	294	3.3	1.3	5.4	3.6	2.3			
	302	3.0	1.0	4.8	2.8	1.8			
Formula I	231	16.8	14.2	23.6	21.1	6.9	2.4	1.4	1.9
	236	13.3	10.7	20.1	17.6	6.9			
	249	8.8	6.2	13.4	10.9	4.7			
	257	6.5	3.9	10.5	7.8	3.9			
Formula J	266	5.0	2.2	8.8	6.3	4.1	2.1	2.0	2.0
	277	4.0	1.4	6.9	4.1	2.7			
	282	3.8	1.3	6.0	3.3	2.0			
	282	3.8	1.3	6.0	3.3	2.0			

\* Time to reach scorch point.

† Time to reach cure point (30 points above minimum viscosity).

‡ Time between scorch point and cure point (corrected).

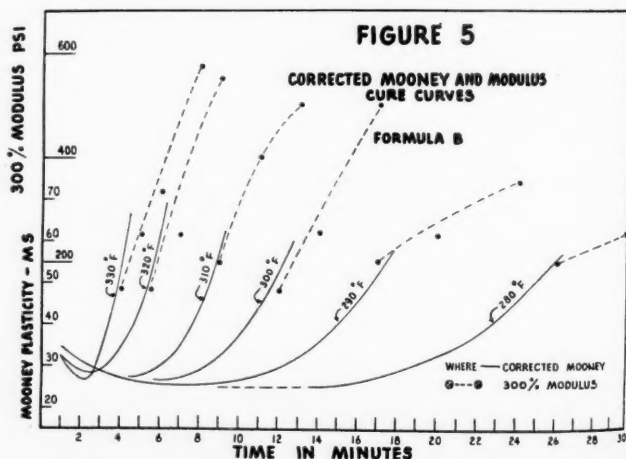
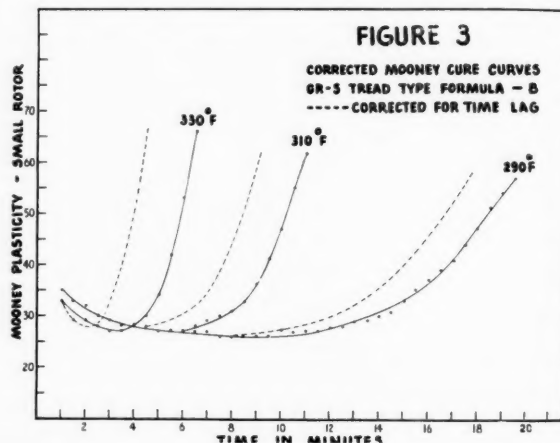
Since the overall curing time is the sum of the scorch



time and the cure time as defined herein, the temperature coefficient of the overall cure rate can be obtained by combining these times and plotting, as above, against temperature. This value is also given in Table 2.

Because of the possible sources of error in calculating the curing effect which occurs during the heating to the impressed temperature, it was considered desirable to check the Mooney procedure by a more conventional method. For this purpose thin press-cured sheets were prepared from several of the compounds used, in a manner which reduced the possible error due to time lag to an insignificant value. This was done by the following method:

The stock was calendered to 0.030-inch thickness on aluminum sheet 0.012-inch thickness. After conditioning the stock to constant humidity, a second sheet of aluminum was rolled on to the other side. The samples thus prepared were cut to 3-1/2 by seven inches. An eight-by eight-inch steam-heated press, which had been carefully checked for temperature control and distribution, was used for curing. A metal separator eight-by eight-by 0.050-inch was made having a section cut out on one side to accommodate the 3-1/2 by seven-inch plied sample. This was placed into the press with the opening toward the front of the press, and the press closed. After the required temperature had been attained in the press platens, the press was opened just sufficiently to permit insertion of the sample and was immediately closed. A stop watch was started when the press was closed. At the end of the cure the sample was removed and dropped into a pail of ice water. Thermocouple measurements showed that the sample attained the impressed temperature in approximately ten seconds. Cures were chosen at each temperature, starting at the shortest time that would give a measurable modulus and with all the time intervals on the rapidly rising part of the modulus time curve. Six temperatures at 10° F. increments were chosen. As



many tensile specimens as the condition of the sample permitted (using a small die  $\frac{3}{4}$ -inch bench marks on a  $\frac{1}{8}$ -inch wide restricted section) were cut from each sheet and pulled on a 60-pound capacity Scott machine. After rejection of bad breaks, the remaining values were averaged, and the modulus values plotted versus time of cure.

From the modulus-time curves so obtained the times required to reach a specific value of modulus at the different temperatures were scaled and are shown in Table 3 along with the temperature coefficients obtained from curves of log time against temperature. The data for the GR-S tread stock are shown in Figure 4. Since the times involved in this measurement include the scorch time, the temperature coefficients obtained should check the overall coefficients obtained from the Mooney data. The results show that the agreement is excellent and indicate that the corrections for time lag in heating the Mooney specimen to the impressed temperature were correct and that the Mooney method is satisfactory for measurements of this kind.

TABLE 3

Formula F		
Temperature °F.	Time to Modulus of 800 Lbs./Sq. In. Min.	Coefficient
230	33.3	1.9
240	27.2	
250	15.	
260	12.5	
270	7.8	
280	6.5	
Formula B		
Temperature °F.	Time to Modulus of 800 Lbs./Sq. In. Min.	Coefficient
280	32.0	1.9
290	22.5	
300	17.0	
310	10.3	
320	7.4	
330	5.8	

The validity of the use of that portion of the Mooney cure curve following the scorch point as a measure of the curing rate might be questioned. While rate of cure measurements are usually based on the rate of change of stress-strain properties, there is no reason why any other property which is altered by the vulcanization process could not be used. That the change in plasticity during the period following the scorch point approximately parallels the change in modulus is demonstrated by the curves in Figure 5. In these curves the modulus data obtained by the procedure described above for the GR-S tread stock have been plotted on the same time scale as the corrected Mooney curves. It is of interest to note that for this particular compound the earliest measurable degree of cure in the press-cured sheets corresponds to a Mooney value (small rotor) of about 50.

## Summary and Conclusions

The Mooney plastometer may be used to measure the scorching rate and the curing rate vulcanizable mixtures over a range of temperatures, including the usual procession and curing temperatures. From the data obtained the temperature coefficients of the two processes can be readily calculated. The values for the latter, for the particular mixtures tested, were as follows:

Formula	Scorch Rate Coefficient	Cure Rate Coefficient	Overall Cure Rate Coefficient
A	2.3	2.3	2.3
B	2.1	1.8	2.0
C	2.3	1.8	2.1
D	2.0	1.7	1.9
E	2.1	2.0	2.0
F	2.4	1.4	1.9

The combined cure rate coefficients should correspond with those determined from stress-strain data. These were found to be:

Formula	Cure Rate Coefficient	
	From Mooney Data	From Stress-Strain Data
B	2.0	1.9
F	1.9	1.9

This agreement confirms the accuracy of the corrections applied to the Mooney data as well as the Mooney method for these measurements.

When the scorch and cure rate coefficients are known, both rates may be measured at one temperature, and the results obtained extrapolated with some confidence to higher or lower temperatures.

## Textile Products

(Continued from page 211)

Let us take advantage of the methods we have learned and continue the discussions of problems of mutual interest.

In your industry you have a unique advantage in that you can expose your product to service testing and can determine the requirements brought about by this testing. A textile manufacturer, on the other hand, has little, if any control over the product that leaves his mill and has little information about the performance of the product except through complaints. There is a great opportunity before us all with the wealth of new materials with which to work and with newer methods of handling old materials. Let us continue with free interchange of discussion of problems and results of tests. Let your supplier know why your requirements are as they are, and he will do his best to help you meet those requirements.

## Aging and Preservation

(Continued from page 215)

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"Plastile Plastic Flooring." U. S. Stoneware Co., Akron, O. 4 pages. This illustrated booklet describes the uses and advantages of Plastile flooring. Specifications and methods of application are included, together with illustrations of standard colors available.

# EDITORIALS

## What Price Rubber Policy?

**I**N THE course of the next few months Congress will have to decide on what the final policy on rubber for the United States is going to be. The so-called "temporary" legislation, Public Law No. 24, will remain in effect only until March 31, 1948, or until Congress enacts new legislation on rubber, whichever is earlier?

P. W. Litchfield chairman of the board of the Good-year Tire & Rubber Co., in a statement made during October entitled, "America Is Ready for a New Rubber Policy," points out that there are two distinct domains in which the overall policy will have to be worked out. One is in the domain of national security, and the other is in the domain of rubber production and use in our normal economy. The most difficult part of the problem is so to construct our policy as to establish an intelligent, workable balance and harmony between the more or less separate and different types of policies required in the two domains.

Mr. Litchfield proposes that in the field of national security, our government should continue to own and maintain in standby condition synthetic rubber manufacturing capacity totaling 600,000 long tons annually, should accumulate, own, and control a substantial stockpile of natural rubber, and should see to it that potential rubber growing areas in the Western Hemisphere are developed to a point where they can be counted on for a minimum annual yield of 100,000 tons.

In the field of our normal economy he proposes that of the potential annual capacity of 600,000 tons, the volume of actual production of synthetic rubber necessary to keep the plants in operating condition and to assure adequate tests-in-use for the product be held to 100,000 tons a year. Mr. Litchfield suggests that this 100,000 tons of synthetic rubber be used in the manufacture of passenger-car and tractor tires and in camel-back since this use would greatly reduce the problem of bureaucratic administration and control.

When the price of natural rubber is only 17¢ a pound, GR-S should be sold for no more than 14 or 15¢ a pound, and it is inferred that even when natural rubber sells for more than 17¢ a pound, the price of GR-S should remain around 15¢.

With regard to policy on synthetic rubber research, Mr. Litchfield emphasizes that everything in our national experience argues that we will get better synthetic rubber more quickly by turning the resourcefulness of industry loose on a competitive basis than by keeping it confined through patent pools and cross-licensing agreements which preclude any one company getting ahead any faster than its competitors.

It has been obvious for some time that the rubber policy decided upon by the next regular session of the

Eightieth Congress will require the solution of the two difficult problems of insuring national security in rubber, which is primarily a governmental responsibility, and, how best to insure the use and improvement in use of the minimum amount of synthetic rubber to be produced to make such national security possible. This second problem is of greatest concern to the manufacturers of rubber goods. Under present-day conditions the government cannot leave national security in rubber entirely up to private industry, and, as a result, private industry can no longer have the complete freedom of action in manufacturing its products from whatever materials it wishes, as was possible heretofore.

It is quite likely that the policy proposed by Mr. Litchfield represents the thinking of the majority of the leaders in the rubber industry. Whether or not Congress will be satisfied to continue government ownership and operation of the synthetic rubber plants, even if such operation is only at a level of 100,000 tons yearly, remains to be determined.

There is one very important point to be settled in this connection, however, and that is the matter of the patent pools and the cross-licensing agreements. The rubber industry is anxious to be released from these agreements, but the government has stated that as long as it is in the business of producing and selling synthetic rubber it wants the agreements continued in order that the processes used and the product manufactured do not become obsolete. At first glance the government's position appears logical, but when all the factors are considered, it becomes evident that rigid adherence to the present policy on patents and cross-licensing will have the effect of retarding rather than promoting research and development on synthetic rubber, both by the government and by private industry.

It was suggested in this column in August, 1946, that vigorous research on synthetic rubber would only be achieved when and if the cross-licensing agreements were terminated. To protect the position of the government and at the same time enable private industry to engage in competitive research, it was recommended that research on synthetic rubber be carried out by private industry and the government in competition with each other also and with only the normal peacetime patent laws as a governing and regulating force. If patents granted to private industry were required to keep the operation of the government synthetic rubber plants up-to-date, then the government should pay royalties to the holders of such patents. If patents obtained as a result of government research were necessary to private industry, royalties on these patents should be paid into the United States Treasury.

Certainly if private industry is to accept some compulsion to use synthetic rubber in order to make workable a national rubber policy for the good of all, then the government will have to accept some compromise in its position on patents and cross-licensing, or synthetic rubber for future national security and peacetime industrial use will not advance technologically at all.

# Scientific and Technical Activities

## New York Group Symposium on Synthetic Resins

THE October 24 meeting of the New York Rubber Group held at the Hotel McAlpin, in New York, N. Y., was featured by a symposium of eight papers on the subject of synthetic resins. An attendance of more than 400 members and guests, presided over by Vice Chairman Joseph E. Waters, of General Cable Corp., in the absence of Chairman Simon Collier, exhibited much interest in the papers presented. A cocktail hour preceded dinner, and the meeting was concluded with entertainment in the form of an excellent variety show.

The first paper, "High Styrene Copolymers in Natural Rubber Compounds," was given by K. M. Fox, of Dewey & Almy Chemical Co. This speaker first pointed out that the use of low-density, light-colored organic resins appears to be a major development in rubber compounding technique to improve processing and properties of natural and synthetic rubber products. Such resins, as cyclized rubbers and high styrene copolymers, are being used to compound stocks to give them high hardness and stiffness, good abrasion and flex-crack resistance, and good tensile and elongation. These types of compounds will mill faster, are smoother in calendaring and extrusion, and mold with less shrinkage and reduced tearing of undercut parts. In synthetic rubber the styrene copolymers are equal to cyclized rubber, but are inferior to the latter in natural rubber. Darex Copolymer #2 is less rubbery than Darex Copolymer #3, and a new high styrene copolymer, now available under the trade name of Darex Copolymer X34, is outstanding in natural rubber compounds for imparting high hardness and reinforcement together with excellent flex life and abrasion resistance. It also improves compression set and flexibility of natural or synthetic rubber stocks.

The effect of Darex Copolymers in natural and synthetic rubber stocks was illustrated, and important uses including floor tile, electrical insulation, toys, household goods, shoe soles and heels, and mechanical goods were described.

In the second paper, "The Use of High Styrene Resins in Non-Marking Soles and Heels," by M. E. Jones and D. M. Pratt of the Marbon Corp., it was explained that Marbon S and S-1, a series of modified styrene resins, were first introduced in 1942 and at the outset were used as reinforcing agents and tubing aids for GR-S in the wire and cable industry. More recently, when restrictions were lifted, other major end uses were developed, including shoe soles and heels. Shoe sole and heel manufacturers have produced a leather substitute based on GR-S reinforced with high styrene resins with wearing qualities far superior to leather. The Marbon S and S-1 resins act as heat plasticizers and processing aids as well as reinforcing agents. Another advantage of these resins is the decreased shrinkage of the uncured stock. The superior wearing features of these high hardness, easy processing, low specific gravity rubber-resin compounds, which have unlimited color possibilities and outstanding resistance to flex-cracking in addition to water permeation, were discussed.

The third paper, also about high styrene resins, had as its title "New and Unusual Uses for High Styrene Copolymers in Rubber Compounds" and was given by W. H. Aiken, of Goodyear Tire & Rubber Co. This speaker first gave a brief review of the development of the use of such resins for reinforcing rubber compounds and then discussed Pliolites S-3 and S-6. It was stated that these two resins were equal to cyclized natural rubber for use in natural rubber stocks and were superior for use in synthetic rubber stocks. The effect of Pliolite S-6 in improving the properties of vulcanizates was also briefly described.

The remainder of this talk was devoted to a discussion of the use of these Pliolites in numerous applications, illustrated by the exhibition of many samples of the products mentioned. These products included rubber flooring, wire insulation, products of high hardness (pistol grips, electrical plugs, dental plate trays, etc.), garter buttons, rubberized clothing, covers for basketballs, softballs, and golf balls, baseball centers, hose and tubing, gaskets for deep freeze units, phonograph records, and specialty items such as cartridge holders and pen and pencil holders. At the conclusion of this talk Rubbermaid sink strainers which were made with Pliolite resins were distributed to each member of the audience.

The next paper, "Coumarone-Indene Resins in Rubber Compounding" was given by T. A. Bulifant, of the Barrett Division, Allied Chemical & Dye Corp. A brief description of the derivation and properties of coumarone-indene resins was followed by a detailed account of the softening, extending, and reinforcing behavior of these resins in natural and synthetic rubbers. Differences in chemical constitution of heat- and acid-polymerized resins and the resultant effects in rubber compounding were discussed. The application of the resins in natural, GR-S, nitrile, neoprene, Butyl, "Thiokol," and reclaimed rubbers was described. It was mentioned that the dispersion of sulfur in the mixed stock is improved by the use of the Cumars. With natural and GR-S rubbers, vulcanization is retarded somewhat, and some adjustment of curing agents is necessary. Improved tear resistance helps removal of products from the mold. It was emphasized that in compounding GR-S with mineral fillers, coumarone-indene resins produce vulcanizates with commercial utility not otherwise achieved. Applications include use in adhesives, cements, hard rubber, friction and laminated stocks, compounded latices and dispersions, and in rubber substitutes.

The fifth paper on the program was entitled "Phenolic Resins in Natural and Synthetic Rubber" and was presented by J. C. Searer, of Durez Plastics & Chemicals, Inc. Phenolic resins are used in the rubber industry in solvent-type adhesives and as plasticizing and reinforcing agents. Specific phenolic resins act as thermosetting plasticizers for most synthetic rubbers and for natural rubber, make processing easier, allow for material increases in loading, and make better extrusion possible. The thermosetting properties of the resins

increase hardness, stiffness, oil resistance, and solvent and abrasion resistance of cured stocks, the speaker said. In addition, excellent surface finishes with very good weather resistance are obtained. These properties have made phenolic resins valuable in shoe soles, top lifts, gaskets, grommets, artificial leathers and films, tire bead stocks, and hard rubber-type materials. When phenolic resins are used to modify rubber-base solvent cements, desirable increases in adhesion, toughness, tack, and heat resistance are obtained. Mr. Searer said in conclusion.

The sixth paper, "Rosin Derived Resins in Rubber Compounding" was presented by C. W. Eurenious, of Hercules Powder Co. It was explained that as a result of the research activities of the Hercules company, several new and interesting products have been added to the rosin family of materials, some of which offer excellent possibilities for use in rubber compounding. Two of these relatively new products, Stabelite Resin (hydrogenated rosin) and Resin 731 (a special disproportionated rosin) are now being produced. It has been found that when these two products are incorporated to the extent of five parts per 100 of natural rubber, advantages over ordinary wood rosin are revealed as follows: (1) There is no depression of modulus when the stock is properly cured, while at the same time a delayed curing effect is obtained. (2) The two modified resins do not contribute to atmospheric cracking.

In addition, Hercules has also introduced a series of resin emulsions called Dresinols. These emulsions are sodium hydroxide and ammonium hydroxide dispersions of modified rosins and special resin acids containing 40-45% solids. They are compatible with animal glue, starch, dextrin, proteins, natural and synthetic rubber latices, polyvinyl acetate, polyvinyl chloride, and water dispersions of phenolic and urea-formaldehyde-type resins. Improvements in wetting, penetration, and adhesion to polar surfaces are generally observed when the Dresinols are used with these materials. In specific cases improvements are also noted in bonding strength, speed of tack, and other properties. Suggested applications are in laminating, heat-sealing, and wet-type adhesives, emulsion paints, coatings and sizings, industrial fabrics, finishes, and binders for various types of fibrous and inorganic materials.

The next paper, "Geon Polyblends," was offered by J. E. Pittenger, of B. F. Goodrich Chemical Co. It was stated that Polyblends can be used in either of three ways: (1) as a thermoplastic material; (2) as a compounded and vulcanized stock; (3) as a modifier for other plastics. Polyblends are a specially prepared mixture of vinyl resin and nitrile rubber, and, as such, each component may require the use of certain compounding materials for best results. Stabilizers for the vinyl resin include basic lead carbonate, Stabilizer SN, and Stabilizer V-1-N. AgeRite Alba or Stalite should be added for heat stability, and for improved light aging, Vanstay, lead titanate, cadmium sulfide, aluminum powder, etc., may be used. Both magnesium oxide and zinc oxide improve light stability, and the latter also acts as an accelerator-activator for the polyvinyl chloride in the Polyblend.

The speaker listed the advantages of the

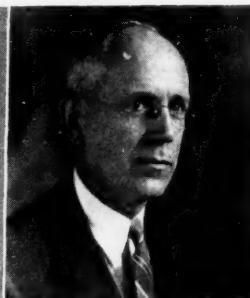
use of Polyblends as follows: (1) They can be placed on a cold mill and processed without initial warming. (2) They can be calendared at rubber processing temperatures after initial heat treatment. (3) In natural rubber stocks they permit the elimination of the plasticizer. (4) When polyblends are used in electrical insulation and other products, the absence of plasticizer removes the danger of plasticizer migration and the resultant staining of materials coming in contact with such products.

The final paper of the symposium, "The S-Polymers," by E. N. Cunningham, of Enjay Co., Inc., described a new type of thermoplastic resinous copolymers of styrene and isobutylene made by the low-temperature technique similar to that used for making Butyl rubber. Production

## Directors of Rubber Division, A.C.S., for 1948



W. W. Vogt



H. E. Elden, Buffalo



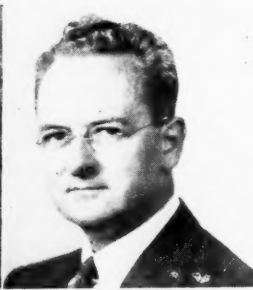
J. H. Ingmanson, Connecticut



G. R. Cuthbertson, Detroit



P. W. Drew, Los Angeles



J. H. Fielding, Akron

Division as instituted in 1946.

India RUBBER WORLD feels that because of the more than usual interest in the results of this election and the wider geographical distribution of the new directors, it would benefit not only the members of the Rubber Division, but others in the industry to present photographs of these new officers, as well as mention of their names and company and group affiliation. Such photographs and the area from which the director was elected are therefore reproduced herewith. In addition, other directors who make up the executive committee of the Rubber Division are also included. Photographs of the chairman, chairman-elect, secretary, and

quantities have recently been made in Canada where equipment was available, and these polymers now may be had in the United States for large-scale development work. Present plans are to manufacture the polymers on a scale sufficient to permit large-volume usage when their industrial utility has been demonstrated, Mr. Cunningham explained.

Two grades are available, S-50 and S-60; the former is a softer and more elastic polymer than the latter. The polymers can be used alone as a plastic or combined with other plastics as a modifying agent. They can be combined with natural and synthetic rubbers to improve processability, water vapor and gas barrier properties and as modifying agents. They can also be used as wax blending agents, combining readily in hot melts. Their heat softening points range from 45 to 60° C., and they have tensile strengths from 2,000 to 3,000 p.s.i. and elongations from 200 to 400%. The S-Polymers were reported to be exceptionally stable to sunlight and ultra-violet light and to be very stable to heat during milling. They are resistant to weak acids and bases and soluble in aliphatic and aromatic hydrocarbons and chloro-hydrocarbons. An important field of application is as a processing aid in nitrile rubber-vinyl resin blends, and considerable experimental work has also been done in blending S-60 Polymer with polystyrene.

The S-Polymers have the possibility of very diversified uses from package coatings to processing aids for materials to be used in conjunction with other polymers. Their ability to be fabricated and used as unsupported films or as coatings and combined with a variety of loading materials over a wide range of colors suggests that they should be very valuable in extending and supplementing the materials available to both plastics and rubber manufacturers, the speaker said in the concluding remarks of the symposium.



J. C. Walton, Boston



C. C. Davis



S. Collier, New York

**A**T THE recent meeting of the Division of Rubber Chemistry of the American Chemical Society, held in New York in September, new directors for the year 1948 were elected from members of the Division residing in the areas served by the 11 local rubber groups sponsored by the Division of Rubber Chemistry. This procedure was in accordance with the new constitution and by-laws of the

treasurer of the Division appeared beginning on page 76 of our October issue.

Newly elected directors from the areas served by the local groups are: *Akron*, J. H. Fielding, Goodyear Tire & Rubber Co.; *Boston*, J. C. Walton, Boston Woven Hose & Rubber Co.; *Buffalo*, H. E. Elden, Dunlop Tire & Rubber Co.; *Chicago*, H. A. Winkelmarm, Dryden Rubber Co.; *Connecticut*, J. H. Ingmanson, Whitney



L. A. Murray, Rhode Island



Arthur M. Neal



S. G. Byam



H. A. Winkelmann, Chicago    B. S. Garvey, Jr., Philadelphia    R. E. Morris, N. Calif.

Blake Co.; *Detroit*, G. R. Cuthbertson, United States Rubber Co.; *Los Angeles*, P. W. Drew, Goodyear; *New York*, S. Collier, Johns-Manville Corp.; *Northern California*, R. E. Morris, Mare Island Naval Shipyard; *Philadelphia*, B. S. Garvey, Jr., Sharples Chemicals; *Rhode Island*, L. A. Murray, Jr., U. S. Rubber.

Other members of the executive committee are: W. W. Wogt, Goodyear, the retiring chairman; A. M. Neal, E. I. du Pont de Nemours & Co., Inc., the unsuccessful candidate for chairman-elect; and C. C. Davis, Boston Woven Hose, and S. G. Byam, du Pont, editor and advertising manager, respectively, of *Rubber Chemistry and Technology*.

#### New A.C.S. Local Section

A new local section of the American Chemical Society has been established at Trenton, N. J., it was announced by Alden H. Emery, executive secretary of the Society. The new section, originally organized as the Trenton Chemical engineers of Mercer County, N. J., except for the Princeton Section area.

N. Richard Yorke, of the Panelyte division of St. Regis Paper Co., who was elected president of the Trenton Chemical Society for 1947-48, continues as chairman of the Trenton Section. Other officers are: Carl W. Virgin, of Vulcanized Rubber & Plastics Co., vice chairman; Francis G. Mendrey, of H. N. Richards Co., secretary; and John J. DeMunnik, of American Tile & Rubber Co., treasurer.

#### New Navy Specifications

THREE new navy specifications have appeared since our previous listing in the October issue. Members of the rubber industry desiring copies of these specifications can obtain them upon request, giving title, number, and date, from the Navy Department, Bureau of Supplies and Accounts, Washington 25, D. C.

Navy Dept. Spec. 27D11, Deck Covering, Light-Weight, Non-Slip (Abrasive-Coated Fabric and Cement), dated 1 Sept. 1947 (1 page).

Navy Dept. Spec. 52P60a, Protective Coating Material, Polymer Powder (Product of an Organic Dichalcide and an Inorganic Polysulfide), dated 1 Sept. 1947 (1 page).

Federal Spec. HH-T-111c, Tape; Rubber (Natural and Synthetic), Insulating, dated 22 May 1947 (1 page).

#### Talks about Standards Bureau

THE Los Angeles Rubber Group held its first technical and dinner meeting of the season on October 7 at the Mayfair Hotel, after a three-month summer recess. At the technical meeting R. H. Taylor, technologist in the Rubber Section of the National Bureau of Standards, discussed the general activities of the Bureau in research and development, testing and calibration, consultation and advisory services, and in participation in technical and scientific organizations and committees. Mr. Taylor gave particular attention to the activities of the Rubber Section, including the development of an elongation at constant stress machine, stress-strain testing in general, and the use of the Mooney viscometer for other than viscosity determinations. Mr. Taylor announced new developments in the use of the Mooney machine for tests other than viscosity, and the perfection of a hydraulic cylinder for opening and closing the machine. The Bureau has developed a technique of measuring cure characteristics with the Mooney machine and has adapted a recording device which shows great promise, but has not as yet been completely evaluated. The most important factors in the testing of rubber, Mr. Taylor emphasized, are preparation of the specimen and the conditions under which the specimen is prepared and milled.

At the dinner meeting J. C. Ballagh, the Group's treasurer, recently returned from a trip to Europe and Africa, spoke on England's austerity program. Many of the privations and hardships being suffered in England are directly due to government blundering, Mr. Ballagh said, and expressed the belief that the labor government in England could not long withstand the pressure caused by the unpopularity of the austerity program.

#### Philadelphia Group Outing

THE Philadelphia Rubber Group outing held on September 12 at the Oak Terrace Country Club, Ambler, Pa., was voted a huge success by the attendance of 127 members and guests. Steak and fish dinners were provided, and some 115 prizes given out, including all types of merchandise and sporting equipment. D. E. Henderson, of Associated Rubber Products Co., was chairman of the outing committee. He was assisted by W. B. Dunlap, of Lee Tire & Rubber Corp., in charge of prizes, Russell Shaw, also of Lee Tire, in charge of golf, and W. B. Munroe, of Linear Rubber & Packing Co., and T. J. Glennon, of H. M. Royal, Inc., in charge of quoits, softball, and other events.

#### Palmer Treats of Reclaim

THE Boston Rubber Group held its regular fall meeting at the Somerset Hotel, Boston, Mass., October 3. The speaker for the technical meeting following dinner was Henry F. Palmer, consulting rubber technologist, who presented a paper entitled "Some Facts and Views on Reclaimed Rubber." Dr. Palmer was chief chemist of the Nylos Rubber Co., manufacturer of reclaimed rubber, for many years. The Boston Group enjoyed, as a second speaker, Denny Myers, head coach of Boston College, Charles E. Reynolds, of The Odell Co., chairman of the Group, presided and introduced the speakers.

Dr. Palmer first discussed reclaimed rubber as a source of rubber hydrocarbon for the manufacture of rubber goods with special reference to the fact that before the late war there were only two major sources, natural and reclaimed rubber; while at present we have three major sources, natural, synthetic, and reclaimed rubber. He cited figures to show, however, that the ratio, reclaimed rubber to total rubber, used, was about the same as prewar. The chief reasons why reclaimed rubber has found such a wide and constant use were given as: (1) economy, (2) ease of processing, (3) uniformity, and (4) faster rate of cure. Each of these reasons was discussed in detail. It was next pointed out that one of the most important problems confronting the rubber technologist is the choice and the proper and efficient use of reclaimed rubber. It was recommended that, as a general rule, the most economical grade of reclaimed rubber in price for a given application should be selected and then the rubber compound built around it. The problems involved in reclaiming synthetic rubber scrap, which are more difficult than those with natural rubber scrap, have now been quite successfully solved, it was stated.

The talk by Denny Myers included a showing of movies of the recent Boston College-Clemson football game, with many instructive and humorous side comments by the speaker on the mechanics and problems of college football as it is played today.

#### Producing Lactoprene EV

LACTOPRENE EV, an acrylic elastomer developed by the United States Department of Agriculture's Eastern Regional Research Laboratory, is now being made on a pilot-plant scale at the University of Akron's Government Laboratories. The rubber is made by polymerizing a mixture containing 95% ethyl acrylate and 5% 2-chloroethyl vinyl ether. Polymerization can be carried on at atmospheric pressure in one hour to two hours.

The rubber can be vulcanized with numerous agents, including sulfur, and many of the accelerators commonly used with natural and synthetic rubbers can be employed, as well as certain other organic compounds. Vulcanizates have excellent heat resistance and maintain their rubbery characteristics even after 700 hours at 300° F. The vulcanized material has unusually long flex life and excellent resistance to mineral oils, sunlight, and air oxidation. Both white and pastel-colored products can be made. Samples of Lactoprene EV and further data can be obtained from the Eastern Regional Research Laboratory, Chestnut Hill Station, Philadelphia 18, Pa.

## Semon on European Research before Detroit Group

**T**HE fall meeting of Detroit Rubber & Plastics Group, Inc., was held October 24 in the Detroit Leland Hotel, Detroit, Mich. Approximately 125 members and guests heard W. L. Semon, director of pioneering research, The B. F. Goodrich Co., speak on "The Relation of European Research and Economics to American Industry." Chairman J. P. Wilson, Ford Motor Co., presided and introduced Dr. Semon.

The speaker discussed not only several of the scientific fields of endeavor in England, Holland, and Switzerland, but also a few of the economic and political problems of these countries, based on a four-week stay in England and visits of two weeks each in Holland and Switzerland.

At the Frythe, north of London, English scientists are doing much basic theoretical work on the properties of polymeric materials, fibers, resins, and rubbers. Investigations were being made of molecular structure by passing ultrasonic waves along stretched fibers. Research was under way on antibiotics, some of which had specific properties superior to penicillin. A great deal of work was also being done on the kinetics of chemical reactions where a process had been developed for holding a reaction in a steady state, it was said.

At the Blackley laboratory, near Manchester, work was being concentrated on the manufacture and properties of high polymers. Emulsion polymers and mass polymers of the neoprene type were being extensively investigated. Researchers were also devoting their energies to synthetic rubbers and to nylon and Terylene, the latter a new fiber prepared from terephthalic acid and ethylene glycol.

Wherever he went in England, new laboratories and expanded research were under way, Dr. Semon said. A large laboratory and development center was being constructed for work on atomic research, for England hopes eventually to be able to use atomic energy to heat homes, to power factories, and thus to supplement the dwindling coal supplies.

The opinion was expressed that certain traits in British thinking and their reluctance to adopt the mass-production methods of the United States were contributing to their slow recovery and inability to compete with other nations industrially. The British are looking to research to get them out of their difficulties, and if they would stop being discouraged and get to work, their prosperity would return, it was added. Labor is a problem everywhere in England. With shorter working hours, longer week-ends, paid holidays, and lower productivity, labor shortages were apparent in almost every place visited.

In Holland the people are better clothed and fed since recovery has been faster than in England. Much research is being conducted in Holland, and although some of it is fundamental research, by far the greater portion deals with practical problems having in view an acceleration of the economic recovery of the country. The Dutch have been quite successful in surfacing a highway with rubber which has lasted for ten years. This rubber road consists of surfacing a concrete highway with a mixture of rubber powder stirred into cutback asphalt. The rubber surface is flexible, tough, and waterproof, hence it prevents moisture penetration to the road bed.

In Switzerland, a country undamaged by war, a condition of prosperity and

independence still exists. Fundamental research is being carried out in the various city universities. Research on the growth of forests, reversed refrigeration, insecticides, fungicides, and pharmaceuticals continues. One of the great concerns of the Swiss people is the encroachment of communism, it was said.

In conclusion, Dr. Semon stated that Europe needs the help of American agriculture and industry, and, in turn, American industry has much to gain by utilization of the research and skills of European nations.

It was announced that the annual Christmas Party of the Detroit Group would be held on December 12 at the Detroit Leland Hotel. The speaker for this meeting will be announced later.

## Buffalo, du Pont, and Nylon

**S**OME 71 members and guests of the Buffalo Rubber Group attended a dinner meeting on October 14 at the Hotel Sheraton, Buffalo, N. Y. Speaker of the evening was Nicholas R. du Pont, manager of industrial sales, nylon division, E. I. du Pont de Nemours & Co., Inc., whose topic was "Buffalo, du Pont, and Nylon."

This talk was of a general nature and consisted of a review of the part the Buffalo area has played in synthetic yarn developments, particularly nylon. Du Pont first began investigation of rayon, then called artificial silk, in 1909. The company's first rayon plant was set up just outside the city limits of Buffalo and has been in continuous operation since 1921. Buffalo is also the American home of cellophane, being manufactured there by du Pont in 1924, and moisture-proof cellophane was first produced there in 1927. The Buffalo plant was also the first to produce rayon staple on a commercial scale in this country, back in 1928. Other Buffalo plant developments were Cel-O-Seal caps and bands in 1931 and cellulose sponges in 1936. Cordura high-tenacity rayon yarn for use in tire cords was first developed in du Pont's Buffalo laboratories.

The speaker gave an interesting review of the development of nylon, with due emphasis on the role played by the company's Buffalo plant. He discussed nylon as it first appeared, its merchandising and initial acceptance, the constant development it has undergone, its properties and applications, and he prophesied that nylon would find ever greater use in the rubber industry as a reinforcement for many rubber products.

## Connecticut Group Outing

**T**HE Connecticut Rubber Group held its second annual outing on September 27 at Eichner's Farm, Trumbull, Conn. Approximately 90 members attended the outing, and the weather, although cool, was ideally suited to the extensive sports program which occupied the entire afternoon. Following an excellent dinner of barbecued beef, prizes were distributed to contest winners, and drawings for door prizes were held.

The highlight of the sports program was a softball tournament among the New

Haven Rummies, the Bridgeport Cop Dodgers, the Naugatuck Valley Burns, and the Palaverer Peddlers. The winner in the tournament was the Naugatuck team, managed by Tom Skipp, of Naugatuck Footwear, which outlasted the New Haven team piloted by Whitey Larson, of Whitney-Blake. Mr. Larson was the winner in the sack race, with H. F. Bethel, of R. T. Vanderbilt, runner-up. In the three-legged race, Ed Valois, of U. S. Footwear, was victorious over Al Crapo, also of U. S. Footwear. Bill Fairclough, of Enjay Co., took first place in the horse-shoe pitching contest, with other prizes going to Mr. Valois, Stewart Gocher, of Du Pont, Fairfield, Bob Blake, of U. S. Footwear, and R. S. Potter, of Armstrong Rubber Co. In the tug-of-war contest, the team captained by Don Spengler, of Sponge Rubber Products Co., won the toss against the team under Bill Kelly, of Du Pont, Fairfield, after the two teams ended in a tie because of exhaustion and lack of time.

The Group's first meeting of the 1947-48 season will be held on November 14, with the place of meeting and the speaker to be announced. Succeeding meetings will be held on February 13 and May 14.

## Amberlite W-1—New Polymer

**A** NEW water-soluble polymer with unusual qualities of uniformity, stability, adhesion, compatibility, and ability to be insolubilized has been announced by the Resinous Products & Chemical Co., 222 W. Washington Sq., Philadelphia 5, Pa. Preliminary tests of the new polymer, called Amberlite W-1, reveal its value in the manufacture of wet-strength paper, adhesives, and cements, as a thickener for latex and neoprene, and indicate potentialities for reproduction operations, printing techniques, sizing, and coatings.

The material is compatible with numerous water-soluble film formers, such as casein, polyvinyl alcohol, carboxy methyl cellulose, and lecithin, dries to a non-tacky film, although it exhibits tackiness similar to a rubber cement during drying; does not support bacterial or fungal growth; and may be insolubilized by heat, formaldehyde, or metallic salts. Air-dried films of the polymer are clear, essentially colorless, quite brittle, and show excellent adhesion to paper, fabric, and porous surfaces. In dilute solution, Amberlite W-1 will emulsify monomeric plasticizers and Paraplex resins to produce stable emulsions.

## Chemical Development Association

**P**LANs to hold two meetings of the Commercial Chemical Development Association have been announced by President L. B. Hitchcock. According to Program Chairman James H. Boyd, the fall meeting had been set for October 28 in Cleveland, O., to be under the local chairmanship of Robert H. Kittner, vice president of Glenn L. Martin Co. A March, 1948, meeting is also assured. According to Dr. Hitchcock, who is also vice president of Quaker Oats Co., the Association is concerned with the problems of marketing new chemicals and the problems of expanding markets for manufactured chemicals.

## Chicago Group Program on Mold Cleaning Methods

THE first fall meeting of the Chicago Rubber Group was held October 3 at the Morrison Hotel, Chicago, Ill. The program was composed of a symposium on "Mold Cleaning Methods" and also had as a special feature a talk entitled "Various Methods of Fire Prevention and Control as Recently Developed" by Floyd J. Lee, of Fog-Nozzle International, Inc., and Seco Mfg. Co. Chairman W. N. Crumpler presided over the meeting, which attracted about 200 members and guests. Dinner was preceded by a cocktail hour.

The first of three speakers in the symposium was J. W. Ayers, of C. K. Williams & Co. and Agicide Laboratories, Inc., who described a wartime development for cleaning molds and other surfaces by bombardment with soft-grit abrasive, Shelblast WD-4B. The abrasive, composed of hard, dense, tough, lignocellulose particles, manufactured from nut shells and fruit pits, was developed during World War II for cleaning carbon from aircraft engine parts. For cleaning rubber molds, this new method provides speed, economy, and thorough cleaning without damaging molds and without operating hazards. The fine size pellets scour remote and inaccessible corners and crevices of molds which cannot be reached by conventional cleaning methods, it was said. No breaking-in after cleaning is needed, and in addition to the cleaning and polishing qualities of Shelblast, it spreads a thin coating of wax, which inhibits rusting of ferrous metals, over the mold surfaces. As compared with sand or steel abrasives, the soft-grit shell abrasive may be recycled 100 times against about six times for the sand and 150-200 times for the steel abrasive, but without the possibility of metal wear inherent with the latter. Molds may be cleaned in or out of presses and in individual heaters without disrupting operations longer than required for cleaning.

The second paper, "Liquid Honing," was presented by V. L. Nichols, of Vapor Blast Mfg. Co. Liquid honing employs grit particles riding in a cushion of water. This method, when used for cleaning rubber molds, results in no appreciable dimensional changes in the mold surface; it cleans and also refinishes, cleans rapidly and thoroughly, is economical, and requires less soap lubricant after cleaning. Longer production runs per mold are obtained after mold cleaning by this method, the speaker added.

Uses report a time saving in this cleaning operation averaging about 75% as compared with older methods. An improved surface on the mold surface after cleaning includes smoothing of rough edges of grind and polish lines. Production runs with molds cleaned by this method have been increased from a few days, to as long as five weeks, it was reported.

The final paper on mold cleaning, "The Chemical Cleaning of Rubber Molds," was given by T. H. Christopher, of Kelite Products, Inc. This company has two non-corrosive, non-inflammable emulsion-type mold cleaners: one for use when the mold can be immersed into the liquid, and the other for use as a brush-on material. The brush-on type, called Formula 304, is applied as a heavy coating about an hour or so before the end of the day, and a second application is made about an hour later. After standing overnight the mold needs only to be rinsed, occasionally followed by a soft brushing, air dried, and it is ready for use.

Formula 304-E for tank immersion work is safe for use on iron or aluminum molds for any length of time, and there is no noticeable chemical breakdown of the product in use. Covered tanks and agitation of the liquid avoid evaporation losses and sludge settling. This chemical method may be used in conjunction with the liquid honing process mentioned in the second paper to reduce greatly overall labor costs, it was said. Blasting time can be cut 75% by precleaning with Formula 304-E. It was emphasized that one of the most important factors in cleaning molds by any method is the frequency of cleaning. The first cleaning of a mold after a long period of production use is usually very difficult, but once the surface is free from carbon, frequent subsequent cleanings are easier. Proper maintenance of the molds with Formula 304 will eliminate the need of any wire brushing. At the most, only fiber brushing is needed while rinsing.

The next meeting of the Group will be held on November 21 at the Morrison Hotel. The speaker will be Benedict Sayre, of Benedict Sayre Co., who will talk on "Managerial Control Tools for Profit." Mr. Sayre, an active consultant on industrial relations and management, will discuss some phases of the profit structure in our complex modern industrial organizations.

The Group Christmas Party will be held on December 19 at the Morrison Hotel.

### Change Dates for GR-S Permit Requests

ON OCTOBER 10 the Office of Rubber Reserve, RFC, notified members of the rubber manufacturing industry that in view of the smaller number of plants now operating in the GR-S program, substantial difficulties are presented in projecting operations in the light of the present courtesy procedure of accepting requests for permits throughout the month in which shipments are made as many of these permits are canceled or expire before the right to purchase has been exercised.

Reference was therefore made to Section 2.22 of the General Sales and Distribution Circular relative to GR-S permits, which states, "Requests should be mailed in sufficient time to reach Rubber Reserve not later than the twelfth day of the month preceding the month in which delivery is desired." Accordingly, requests for November delivery must have been received by ORR not later than October 15, and requests for deliveries in subsequent months must conform to the Section quoted above. Requests for deliveries from consumers not falling under the R-1 Order must also be made in accordance with the above Section.

### Molds for Rubber and Plastics

THE Southern Ohio Rubber Group held its second semi-annual technical meeting on October 9 at the Gem City Club, Dayton, O. H. O. Popck, chief tool engineer of Inland Mfg. Division, General Motors Corp., spoke on "Molds as Applied to Rubber and Plastics." This talk consisted of three parts. The first was a presentation of "Island of Yesterday," a motion picture showing prewar life on the island of Sumatra and including views of

the growing and preparing for shipment of crude rubber. The second part of the talk covered vulcanizing presses and molds and their operations and was illustrated by means of slides. Also included was a discussion of product design, mold terminology, the finishing and trimming of manufactured products, and a discussion of the different types of molds. The third part of the talk was a question and answer period, with questions from the floor, in which Mr. Popck was assisted by Ray Fogle, tool room foreman, James Hutchison, mold foreman, and Don Fair, trim engineer, all of Inland.

Next came a sound and color motion film showing the operations of a reclaiming plant, presented by Alvin Fuhrman, representative of Midwest Rubber Reclaiming Co.

The technical meeting was preceded by a dinner and business session. At this business meeting the members of the nominating committee were announced, as follows: Joseph Rockoff, chairman, Herman Wening, Richard A. Clark, James Liston, A. J. Marshall, and L. J. Gordon. Nominees are to be presented at the Group's next meeting on December 18. This meeting will be a dinner-dance with no technical session and only a brief business session. Christmas gifts will be distributed to the wives of members who attend this meeting, to be held at the Miami Valley Country Club, Dayton, O.

### Materials Handling Exposition

THE second National Materials Handling Exposition will be held in the Public Auditorium, Cleveland, O., on January 12 to 16, 1948, it was announced by Edwin J. Heimer, chairman of the exposition committee and president of Barrett-Cravens Co. The exposition will occupy almost 200,000 square feet of exhibit space, nearly three times the previous area, and 180 exhibitors, 60% more than last year, have already contracted for booth space.

All systems of materials handling will be on exhibition to make the showing completely representative. Educational features will include a conference on materials handling, to be held concurrently with the exposition; a materials handling theater which will present films on handling subjects; and an institutional presentation of materials handling equipment and systems in addition to those shown in the commercial exhibits.

More than a dozen topics of vital interest to the rubber and tire industries will be discussed at the Conference on Materials Handling, which will be a feature of the Exposition. The major theme of the discussion will be cost reduction through improved handling, and discussion subjects have been selected for their widest appeal from the practical, operating standpoint. Discussions will cover all phases of handling operations from the viewpoints of manufacturer, distributor, jobber, and retailer and will include problems of warehousing and shipping.

Keenest interest from the rubber and tires industries is expected to center on the discussions of "Arranging Stock for Effective Handling," "Handling Factors in Plant Layout," "Planned Packing for Efficient Handling," "Handling Unusual Shapes," "Vertical, Horizontal, and Inter-Floor Handling," "Reckoning with Floor Loads and Elevator Capacities," "Handling Bulk Products," and "When Manual Operations Pay."

## Additional Experimental GR-S and GR-S Latexes

X-NUMBER	MANUFACTURING PLANT	DATE OF AUTHORIZATION	POLYMER DESCRIPTION	SPECIAL CHARACTERISTICS
X-408 GR-S	Goodrich, Port Neches	10/3/47	Same as GR-S-18 except that it will be stabilized with antioxidant 190 X-3 (an experimental variation of Stalite).	GR-S-18 is GR-S-10 which has been stabilized with Stalite instead of BLE or PBNA. X-408 should be relatively non-staining.
X-409 GR-S Latex	C. S. Rubber, Nantuxuck	9/25/47	Type IV GR-S latex at a higher solid content. Has a monomer charge ratio of 50 butadiene and 50 styrene with mixed rosin soap emulsification.	Specification limits: Total solids 45.0% min. and 50.0% max. Residual styrene—0.10% max. on total latex. pH—10.5 min., 12.0 max. Mooney viscosity range—80 to 100.
X-410 GR-S	Firestone, Akron	10/3/47	69.7 butadiene-30.3 styrene monomer charge ratio, with oleic acid, soap emulsification at high conversion. Stabilized with 3.65 parts PBNA. Also contains 0.15-part candle-lilla wax and 0.45-part white oil. Alum coagulated. No Mooney specified since modifier will be held constant.	One-half cent premium over standard GR-S to cover cost of additional chemicals.

## New Organic Chemical

THE successful completion of research work on a new organic chemical, beta-propiolactone, was recently announced by H. E. Fritz, vice president in charge of research for The B. F. Goodrich Co., Akron, O. Concurrently, W. S. Richardson, president of B. F. Goodrich Chemical Co., Cleveland, O., announced experimental production of this new chemical. The product was described by T. L. Gresham and J. E. Jansen, B. F. Goodrich research chemists, at the recent American Chemical Society meeting in New York. The use of beta-propiolactone as a basic chemical makes possible the commercial production of whole series of organic chemicals hitherto only laboratory curiosities, it is claimed. In addition, it is claimed the product promises to open up new and cheaper methods of producing many basic materials already in use. Fields in which the new chemical is expected to contribute either better or more economical products include: compounds for preserving fats and oils; thermosetting resin products; plant-growth initiators; mold-growth inhibitors; essential ingredients for certain synthetic rubbers; fungicides; selective weed killers; polymerizable esters for plastic products; intermediates for the paint industry; rubber compounding chemicals and solvents; and blends of synthetic rubber with plastics.

## New Finish for Rubber

A NEW pre-cure wax finish for molded, extruded, or calendered rubber products has been announced by Johnson's Wax Co. Known as Johnson's #3037 Pre-Cure Finish, the material prevents sticking during storage of uncured rubber stocks and also serves as a mold release. There is no mold build-up because of carbonization, and the wax finish also eliminates a final cleaning operation. The new wax permeates the surface of finished products, giving a smooth, satin-like finish that is completely dry. Being water-dispersed, the wax may be applied without any fire hazard. No expensive application equipment is required as the wax may be economically applied by conventional spray, dip, or flow-coat methods.

## Tropical Deterioration of Materials

AMERICAN wartime research for the prevention of deterioration of optical instruments, textiles, synthetic resins, plastics, photographic equipment, and other materials in tropical climates is summarized in a report now on sale by the Office of Technical Services, United States Department of Commerce. In the course of the research, about 4,500 fungus cultures and 1,100 bacteria cultures were collected from tropic lands for experimentation and study. Though many problems were solved only (the work is being continued by the Army and Navy), several positive remedies were discovered, and a large body of background information was accumulated.

The report summarizes results of tests on flying clothing, airplane fabrics, fruit bars, shoes, stitched leather, filter papers, sheet insulating materials, plastic terminal strips, gas masks, cotton fabrics, paper pads, strippable coatings, ear wardens, neoprene earphone sockets, spray coatings, cork samples, glass cord plastics, hookup wires, lenses, felt, and other materials. The report, PB-81801, "Tropical Deterioration of Equipment and Materials," comprises 91 mimeographed pages and is priced at \$3.50. Orders for the report should be addressed to the Office of Technical Services, Department of Commerce, Washington 25, D. C., and should be accompanied by check or money order payable to the Treasurer of the United States.

## Chicago Chemical Exposition

THE date for the fifth National Chemical Exposition by the Chicago Section of the American Chemical Society has been set for October 12 to 16, 1948, at the Chicago Coliseum, it was announced by L. E. Clifcorn, chairman of the A. C. S. exposition committee. According to Dr. Clifcorn, floor plans for the show will be in the hands of former exhibitors on January 5, 1948, and they will have about two weeks to select their space before it is thrown open to others.

The 1946 show was a sell-out, so it is

## CALENDAR

- Nov. 5-7. American Society of Body Engineers, Inc. Annual Convention, Rackham Memorial Bldg., Detroit, Mich.
- Nov. 13. Rhode Island Rubber Club. Crowe Hotel, Providence, R. I.
- Nov. 14. Connecticut Rubber Group.
- Dec. 1-6. Twenty-First Exposition of Chemical Industries. Grand Central Palace, New York, N. Y.
- Dec. 2-5. American Society of Mechanical Engineers. Annual Meeting. Atlantic City, N. J.
- Dec. 2. Los Angeles Rubber Group, Inc.
- Dec. 5. Philadelphia Rubber Group. Kugler's Restaurant, Philadelphia, Pa.
- Dec. 8-13. Annual Automotive Service Industries Show. Navy Pier, Chicago, Ill.
- Dec. 9. Buffalo Rubber Group. Christmas Party.
- Dec. 12. Boston Rubber Group. Christmas Party. Hotel Somerset, Boston, Mass.
- Dec. 12. New York Rubber Group. Christmas Party. Hotel McAlpin, New York, N. Y.
- Dec. 12. Detroit Rubber & Plastics Group, Inc. Annual Christmas Party. Detroit-Leland Hotel, Detroit, Mich.
- Dec. 18. Southern Ohio Rubber Group. Christmas Party. Miami Valley Country Club, Dayton, O.
- Dec. 19. Chicago Rubber Group. Christmas Party. Morrison Hotel, Chicago, Ill.
- Jan. 12-16. Society of Automotive Engineers. Annual Meeting. Book-Cadillac Hotel, Detroit, Mich.
- Jan. 12. Second National Materials Handling Exposition. Public Auditorium, Cleveland, O.
- Feb. 6. Akron Rubber Group
- Feb. 6. Chicago Rubber Group. Morrison Hotel, Chicago, Ill.
- Feb. 13. Connecticut Rubber Group.

hoped that the present building program at the Coliseum which has already provided a new entrance will be completed to the point of providing added ground floor exhibit space in time for the 1948 exposition, Dr. Clifcorn said. Marcus W. Hinson, manager of the previous expositions, has again been engaged to manage the details of the forthcoming show.

## Rocket Power Discussed

THE October 16 meeting of the Akron Rubber Group, at the Mayflower Hotel, Akron, O., featured a talk on "Commercial Application of Rocket Power" by W. P. Berggren, technical representative of Aerojet Engineering Corp., a subsidiary of The General Tire & Rubber Co. and maker of Jato (jet-assisted take-off) motors.

The Jato unit described by Dr. Berggren is a metal bottle attached to the underside of an airplane wing. The bottle contains a solid, asphalt-like, combustible material which burns only under high pres-

(Continued on page 229)

# Plastics Technology

## Preheating Thermoplastic Materials<sup>1</sup>

Roy R. Leiske<sup>2</sup>

**G**OOD molding consists of structurally sound, well-designed pieces, free from surface defects, manufactured to meet competition, and produced at a profit. To accomplish this, four variable factors must be controlled:

- (1) Temperature of the heating cylinder. It is possible to control this temperature with the present pyrometer equipment to within five degrees' practical temperature.
- (2) Die temperature. It is possible to control this temperature with thermostatic valves also to within five degrees' practical temperature.
- (3) Accurate control of the cycle. With timing devices available today, it is possible to control the cycle time to within 1/10-second.
- (4) Material. It is likewise now possible to control its temperature to within five degrees' practical temperature.

We have spent a year and a half doing research and experimental work on this last factor to produce a machine that will furnish a constant temperature, handle material at a measured rate, and automatically deliver the material to the injection cylinder of the molding machine.

Preheating affects both production and quality. It is absolutely essential that the material delivered to the injection cylinder be at a constant temperature in order to maintain a regular cycle. Preheating drives off volatile matter such as excess plasticizer and, in the case of polystyrene, residual monomer which is permitted to exist in a quantity no greater than 1%, and moisture is permitted only in very minute quantities.

### Effect of Moisture

From our experience the effect of moisture, either "free" or contained, has been overly stressed. The general consensus of opinion is that it is necessary to restrict its volume to 0.5% in order to obtain good molding qualities. I have never met anyone who could give any scientific basis for this statement, and I very much disagree with it.

In one of the experiments we performed we thoroughly soaked a specimen of cellulose acetate butyrate, shook off the excess moisture, put it through our drying machine, and molded it immediately. There were absolutely no bad effects from this treatment although the specimen was "super-saturated" with moisture. However, if the product being molded must maintain good dielectric properties, I do agree that it is necessary to restrict the moisture content to a minimum, but I do not believe that it must be generally restricted for the main reason that it results in bad molding.

### Effect of Humidity

It is my opinion that the factor which determines the good or bad molding char-

acteristics of plastics material is relative humidity, which is more concerned with the temperature of the specimen than the amount of moisture in it. The definition of relative humidity is the amount of moisture in a specimen compared to the amount of moisture that that specimen will hold at a given temperature and at a given pressure.

Let us assume that a specimen of material has 20 grams of water in it at 30° C., and that at the same temperature the specimen is capable of holding 30 grams of water. We then have a specimen whose relative humidity is 66%. Now, if we take that same specimen and, without removing any moisture, raise its temperature to 100° C., the specimen would then be able to hold 597 grams of water. The relative humidity would then become 3.3% instead of 66%. Water is hard to drive off in any other way than in the form of steam at 212° F. However most thermoplastic materials begin to soften at 195° F.—in some cases lower—so that it is apparent that preheating cannot drive off "free" or contained moisture. The only way that the moisture can be removed is by evaporation in an evacuated medium, which is very slow and difficult and is only practical for laboratory use. The gases that are driven off when heat is applied to plastic material are usually derived from the plasticizer and other volatile matter which can be removed at temperatures below 190° F. If additional heating capacity were all that is needed, it would be a simple matter to lengthen the heating cylinder and add more heating bands. But that is not the case. It is necessary to preheat the material and drive off as much volatile matter as possible before it enters the heating cylinder to avoid trapping the vapor in the heating cylinder.

I know of a company that tried to mold a batch of material, but encountered so many surface defects that it had to discontinue its use. The material was put back into the warehouse. Two months later the same material was again put into a machine and molded with absolutely no bad effects.

Invariably surface defects, such as mica effect or silver streaks, occur on days when the atmospheric pressure is high and the relative humidity very high. I am convinced that the answer lies some place within these factors. At the present time we are conducting a long-term experiment in an effort to correlate the effects of atmospheric pressure and relative humidity upon molding.

### Use of Preheating

I have a record of a 16-ounce machine installed in the Chicago area for injection molding 12 ounces of polystyrene. The machine's cycle time was 40 seconds; total die opening time was 12 seconds; injection time was 16 seconds; and holding time was 12 seconds. The die did not fill regularly because of insufficient heating of the polystyrene. By installing a preheating unit and preheating the material to 160° F. at the time it was placed into the heating cylinder, we shortened the die opening time to nine seconds.

Because we were able to increase the maximum temperature in the heating cylinder, the material was in a softer condition, and the injection time was also cut to nine seconds. Of course the holding time could not be changed. This preheating resulted in saving ten seconds per cycle, or increasing the production by 25%. The die filled regularly with no difficulty whatsoever. As a matter of fact, because of the higher temperature, it was found necessary to stop the circulation of warm water through the die.

The problems of preheating are many and varied. To begin with, all plastic materials have low specific heats, varying from 0.24 to 0.56. This point means that they are good insulators, making it very difficult to put heat into the material. After preheating, if kept in a large mass with a small area exposed to radiation, a plastic material retains that heat for a considerable length of time. The general impression is that plastic material loses its heat rapidly, but this is an erroneous belief.

With heating equipment that does not stir and mix the material while the heating is in process, the temperature does not become uniform throughout. As a rule, the material lying on the surface gets enough heat to plasticize the top layer and forms a crust, while the material that lies beneath this crust actually is insulated. The temperature between the top and the bottom of a plastic material having two inches of depth can vary as much as 75° after 15 minutes of heating, if it is not stirred. If this material is taken out and put into a container, within a short time an average temperature will be reached which is considerably below the maximum obtained during heating. While this loss is only a leveling out of the temperature, it has led to the belief that plastics materials lose heat rapidly.

Another difficult problem with which we have to deal is the differences in granulation of the various materials on the market. Materials come in diced, extruded, pellet, batch, clear fines, and many other forms of granulation which make it impossible to say that a definite temperature can be reached. We have been able to preheat polystyrene in pellet form to over 190° F. However, if this material has been put through a grinder and it contains a large percentage of fines and little slivers, we must lower the heat to 180° F. in order to keep the fines from plasticizing in the heating chamber before the large pellets have reached 180° F. This point holds true for every material made. The form of the plastic material affects the temperature to which it can be preheated. When an increase in percentage of fines occurs, the maximum temperature to which we can preheat the total mass before it begins to plasticize is always below that of virgin material. We are now recommending an average temperature of 160° F. for all materials, except nylon, that we preheat in our machine to eliminate any possibility of plasticizing material during preheating.

All plastic material has a static charge that makes it difficult to move along in any continuous process. However we have incorporated factors in our equipment which minimize this to a point where it is negligible.

Although we do not know all the answers to molding problems being encountered every day, we are attacking the problems in a thorough manner and hope eventually to treat plastics molding as a mathematical science. We believe that this can only be done after long and detailed experiments.

<sup>1</sup>Presented before Society of Plastics Industry, annual convention, Chicago, Ill., May 9, 1947.

<sup>2</sup>Leiske Machine Co., Milwaukee, Wis.

## Polyethylene Extrusion<sup>1</sup>

G. G. Himmler<sup>2</sup>

**P**OLYETHYLENE resins are inherently flexible thermoplastic materials having a basic translucent white color. They have been made in various molecular weight grades and are now being supplied in quantity in the D-55 grade. This indicates that the Williams flow height, as determined by the parallel plate plastometer, is 55 mils at 130° C. Polyethylene resins for extrusion are supplied in granular form in a variety of translucent and opaque colors.

Commercial extrusion of polyethylene resins began in this country in 1943. The first extrusion application was that of coating electrical conductors. This came about because of the excellent electrical insulating properties of polyethylene and the urgent need of coaxial cable insulation in radar equipment. Since that time numerous other products have been fabricated from polyethylene by extrusion. These include rods, tubes, tapes, thin films, and monofilaments.

### Extrusion Machines

Polyethylene resins may be extruded readily by conventional thermoplastic extrusion machines. Single thread screws of decreasing pitch from feed end to exit end are preferred. They develop the greatest pressures and are the most easily cleaned. Because of the fluidity of polyethylene at extrusion temperatures, clearance between the screw end and the cylinder wall has an important effect on extrusion pressure. A radial clearance of 0.005-inch is preferred and should never exceed 0.015-inch.

Standard materials used for the construction of the cylinder, screw, head, and die are satisfactory. Because of the excellent chemical stability of polyethylene, special corrosion resistant alloys are not required. However, for long life, cylinders should be fabricated from alloys having a Rockwell "C" hardness of about 70. Stainless steel or steel of similar toughness and rigidity may be used for the screw, but it is desirable to hard-face the screw lands with a material such as Haynes Stellite alloy.

Breaker plate and screens are a necessity in the extrusion of polyethylene in order to plasticate the resin uniformly. The breaker plate should have holes of equal diameter uniformly spaced. The diameter of these holes is not critical; 1/8- to 5/16-inch holes are satisfactory.

The finer mesh screens are preferred. For example, for general extrusion of rods, tapes, and wire insulation a screen pack consisting of one 20-mesh, one 40-mesh, and one 100-mesh screen is adequate; while for the extrusion of thin wall tubing, thin film, and monofilaments a combination of one each of 20-, 40-, 100-, and 200-mesh screens is more desirable. These fine mesh screens are necessary in the latter applications because of their critical compound homogeneity requirements.

### Extrusion Temperatures

Polyethylene is fed to the extruder in the granular form supplied. No heating or drying of the granules is required prior to extrusion. Since polyethylene resins soften sharply in the temperature range of 108 to 112° C. (227 to 234° F.), it is

preferable that the feed chamber be kept below 80° C. (176° F.). This is to prevent bridging of the granules which would cause their flow or feed to the screw to be non-uniform or to stop entirely. The extrusion cylinder should be divided into at least two jacketed zones which can be heated by steam or circulating oil. The head and the die are usually heated by electric heaters.

Best extrusion results are obtained when the compound extruding from the die is at a temperature of 160° ± 50° C. (320° ± 10° F.). Temperatures at which the various sections of the extruder should be maintained vary with the type, size, and speed of operation of the extrusion machine used. However the following set of temperatures may be used as a guide:

Back cylinder	110° C. (230° F.)
Front cylinder	135° C. (311° F.)
Head	158° C. (317° F.)
Die	170° C. (338° F.)

The extrusion temperatures for polyethylene are not critical. In most cases temperatures more than 5° C. (10° F.) below those indicated should not be used; while in other temperatures as much as 20° C. (35° F.) higher are desirable. For extruding shapes of small cross-sectional area, such as thin films and monofilaments, even higher temperatures on the head and the die are permissible in order to obtain higher extrusion rates. In these cases head and die temperatures as high as 220° C. (428° F.) and 240° C. (464° F.), respectively, may be used to advantage. While not necessary in some machines, cooling of the screw is desirable in order to maintain a uniform rate and quality of extrusion. Room temperature water passed through the screw at a slow rate has been found to be satisfactory.

### Extrusion Rates

Speed of operation of the screw is dependent largely on the mechanical limitations of the machine. Screw speeds of 10 to 70 r.p.m. have been used.

Rate of extrusion is dependent on the size of extruder used, the speed of the screw, and the cross-sectional area of the piece to be extruded. Using a screw of 30 r.p.m. under normal operations, an extruder having a two-inch diameter screw will produce 20 pounds of polyethylene an hour; a 2½-inch diameter screw will extrude 35 pounds an hour; while a 3¼-inch screw will handle 60 pounds an hour.

### Die Design

The rules of die design which are followed for other thermoplastics apply generally to dies for the extrusion of polyethylene. Dies should be streamlined so that no stagnant areas exist. The cross-sectional area of the section to be extruded has an influence on the length of die land necessary. In coating wire, die lands should be approximately five times the diameter of the coating. This same ratio has also been found satisfactory for monofilaments under 1/8-inch diameter.

For tubing having an inside diameter of 1/4- to one-inch and a wall thickness of 0.040- to 0.100-inch, a 3/4- to one-inch die land is suitable. In the extrusion of thin wall tubing and thin film where thickness at the die is 0.010- to 0.015-inch, a die land length of 3/16- to 5/16-inch is recommended. A land length of 3/4- to one-inch is generally satisfactory for extruded tapes 0.040- to 0.080-inch thick.

In the design of dies for polyethylene it is more desirable to overestimate rather

than underestimate the length of land. The longer the die land, the smoother and glossier will be the extruded section. Because of the fluidity of polyethylene at the die, long land lengths do not seriously reduce extrusion rates.

### Extrusion Molding

The application of polyethylene to wire is done with standard plastic wire coating extrusion equipment. The speed of the wire is so regulated that the diameter of the hot polyethylene coating is approximately die size. To prevent voids from forming between the wire and the coating and in the coating itself, wires having a coated diameter of 3/16-inch or over must be cooled rather slowly. This slow cooling is usually accomplished by running the wire through a cooling pipe 50 to 75 feet long having a temperature gradient of 77 to 25° C. (170 to 77° F.) from entrance to exit ends.

Tubing having wall thickness up to 0.100-inch can be made by standard horizontal extrusion into cooling water at 35 to 50° C. (95 to 122° F.). It is necessary to apply air pressure to the inside of the tubing for support. It is desirable that the tubing be pulled away from the die orifice so that it is equal to or less than the orifice in diameter. Polyethylene tubing or pipe having wall thicknesses of more than 0.100-inch and requiring reasonable tolerances are best prepared by extruding over a pipe mandrel by means of a wire coating type cross-head. Length of pipe in this case is, of course, limited to the length of the mandrel used.

Tubing having a finished wall thickness of as low as two mils may be made by extrusion in a vertical direction into cold water or air. The die must be perfectly centered in relation to the pin since a thin wall on one side of the tube will result in blowouts.

Film in thicknesses as low as two mils and over 48 inches in width can be made by vertical extrusion into water from a flat die. Tapes and rods are formed by horizontal extrusion into water at 35 to 50° C. (95 to 122° F.).

A continuous extruding and orienting operation is used to produce monofilaments from polyethylene. The monofilaments are extruded vertically into room-temperature water from a multiple orifice die. As many as 36 strands have been extruded at one time. The cooled monofilaments may then be oriented continuously by a stretching and annealing process. These operations are carried on with the use of three pairs of rolls, commonly referred to as godet or snub rolls. The monofilaments are first stretched 560 to 600% between the first two rolls, then annealed by passing them through an 85° C. (185° F.) water bath between the second and last rolls. No stretching or shrinking is permitted in this operation. The finished monofilaments are then wound on spools for subsequent fabricating operations.

Relatively long extrusion runs can be made with polyethylene without any shut-down whatsoever. Length of run varies with the screen size used, but continuous runs of 36 to 48 hours without change of screens are common. When it is necessary to clean out the extruder completely, a vinyl purging compound has been found to do an excellent job.

### Applications

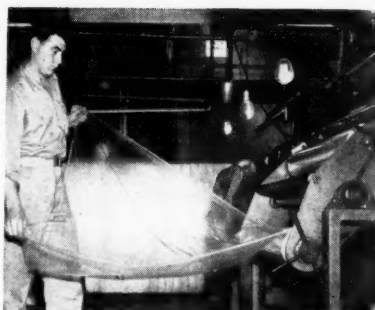
At present, polyethylene insulated wire is used on television, radar, power, and telephone cable and in low-voltage distribution systems. On underground and overhead communication cables it is used as a

<sup>1</sup> Presented before Society of Plastics Industry, annual convention, Chicago, Ill., May 8, 1947.

<sup>2</sup> Bakelite Corp., New York, N. Y.

protective outer jacket. Applications requiring odorless, tasteless, and non-toxic tubing, as for example in handling beverages, are a "natural" for polyethylene. Because of its chemical resistance, polyethylene also makes excellent piping or pipe lining for industrial applications. Large-diameter thin-wall tubing is used as a protective bag material; while thin sheeting is used for food packaging, garment bags, etc. Polyethylene tapes make attractive wetting for outdoor furniture. Cloth fabricated from polyethylene monofilaments makes attractive and colorful luggage and seat covering. It is also used to fabricate women's accessories, such as handbags and hats.

Summing up, it is seen that polyethylene has many possibilities as extruded sections. Much progress has been made in the technique of extruding polyethylene, but much more remains to be learned.



Reynolon Plastic Film from Geon Latex

the new film is in the method of formulating the latex and in the casting which is done on a continuous stainless steel belt more than 300 feet in length. The belt passes through a specially designed oven where temperatures are controlled to  $\pm$  two degrees. The belt then continues back through an area where the film is cooled, stripped, and wound on a roll by automatic tension control equipment.

Processing films from latex offer many advantages, such as elimination of flammable solvents, and freedom from solvent retention which is so objectionable in food wrapping. Reynolon film can be modified to give any degree of stiffness or softness and has glass-like clarity and brilliance. Colors and pigmented films can be supplied for special cases. A wide variety of plasticizers can be used for specific problems, or where edibility and contamination are important factors.

## Plastics Exposition

THE third National Plastics Exposition, sponsored by the Society of the Plastics Industry, Inc., will open on September 27, 1948, and close the evening of October 1. The show will be held at Grand Central Palace, New York, N. Y., and will not be open to the general public. The Exposition will open daily at 1:00 p.m. and close at 10:00 p.m., except for Wednesday, September 29, when it will close at 6:00 p.m.

Particular attention will be given to encouraging attendance of retailers, buying office representatives, and chain-store executives. Invitations to the Exposition will be sent to exhibitors for distribution by these firms to their customers and guests. No dates have as yet been set for the 1948 SPI annual conference, but the Society's annual banquet will be held on Wednesday evening, September 29.

## New England SPI Group Meets

THE New England Chapter of the Society of the Plastics Industry held a two-day meeting on October 14 and 15 at the Equinox House, Manchester, Vt. About 180 members and guests attended the meeting, which included technical sessions on industrial problems, a business meeting, and a dinner.

Speakers on October 14 were Benjamin Werne, attorney and labor relations counsel, whose topic was "Operating under the Taft-Hartley Labor Act," and James Thomas Chirurg, of the advertising firm of James Thomas Chirurg Co., who dealt with "How to Promote Your Business." Carl Sundberg, of Sundberg-Ferar, industrial designer, spoke October 15 on "Design as a Factor in Merchandising" and was followed by Donald S. McKenzie, general sales manager of the chemical department General Electric Co., who treated of "Our Sales Responsibilities."

At the business meeting Horace Gooch, of Worcester Molded Plastics Co., was elected chairman of the section for the forthcoming year. The dinner took place on the evening of October 14. Gov. Ernest W. Gibson of Vermont and George H. Clark, president of the SPI and vice president of Formica Insulation Co., were guests of honor at the dinner and addressed the assemblage.

## New Vinyl Packaging Film

A CLEAR, tough, flexible packaging film cast from a colloidal dispersion of polyvinyl chloride plastic in water has been announced by Reynolds Research Corp. Called Reynolon, the new film is made from Geon latex, a product of B. F. Goodrich Chemical Co., and is said to be the first free film made from this material.

Reynolon is ideally suited for food packaging and protective covering of many types and is well adapted for use on most automatic packaging equipment. It can be sewed or electronically heat-sealed and is available in gages ranging from one to three mils (0.001–0.003-inch), and in widths of 36 to 46 inches. The new material has excellent resistance to moisture and vapor transmission, good light and heat stability, and film thickness controlled to  $\pm$ 0.001 inch, according to its maker.

The secret underlying the production of

## Rocket Power Discussed

(Continued from page 226)

sure and can be fired by a spark. Once fired, the unit exerts about 1,000 pounds of thrust over a period of about 40 seconds. In commercial applications Jato motors are used to get heavily loaded planes into the air with a minimum of runway travel. The motors are usually mounted in pairs; the number depends on the amount of additional thrust desired. During the war the motors were used extensively in military air operations. Dr. Berggren also presented motion pictures of Jato units in action, being tested on commercial planes, and some captured German films showing early German experiments on rockets, particularly the V-2 rocket.

## A. C. S. Plastics Division

THE Division of Paint, Varnish and Plastics Chemistry of the American Chemical Society will celebrate its twenty-fifth anniversary during the Society's 1948 spring meeting in Chicago, Ill., April 19 to 23. The Division will conduct a symposium on alkyls on the morning of April 22, with a special anniversary program in the afternoon, followed by a social hour and banquet in the evening. The high polymer forum will be held as usual, with the Colloid Division as sponsor. The plastics group of the Paint, Varnish and Plastics Division will meet on April 21, and the paint and varnish group will convene on April 23. The deadline for papers to be presented before the division is February 13.

The A. C. S. 1948 fall meeting will be the first meeting in separate localities of various associated divisions of the Society. The plastics division will meet in Washington, D. C., starting August 30, with the divisions of Rubber, Industrial and Engineering, Biological, Medicinal, Fertilizer, and History of Chemistry also gathering there. July 2 is the deadline for papers intended for presentation before the plastics division at this meeting. The high polymer forum will also be held in Washington.

At the recent A. C. S. meeting in New York, P. O. Powers was appointed by the executive committee to the chairmanship of the Paint, Varnish and Plastics Division. M. M. Renfrew was chosen chairman-elect, and R. H. Ball, P. O. Blackmore, and R. B. Seymour were elected to the executive committee.

## Odorants for Adhesives

THE application of rubber latex adhesives in industrial enterprises, such as in shoe factories where they are used to paste the lining to the leather, has made the disagreeable odor a problem for employers. An unpleasant working atmosphere hinders production and causes discontent among the workers. The industrial aromatics division, Givaudan-Delawanna, Inc., 330 W. 42nd St., New York 18, N. Y., has several odorants which they recommend for this situation. These products include Adhesive Odor GD-2861, a floral-minty material; and Adhesive Odor GD-26276, a sweet, fruity-type material which is long-lasting and potent. In addition to these odorants which are specifically recommended to the shoe cement industry, the company also supplies the following two materials useful in other latex adhesives: Adhesive Odor B 5145 for masking adhesive odor; and Parador A, a floral material that is also used in dry rubber.

For cellulose nitrate and acetate cements, Givaudan suggests Adhesive Odor GD-2705, a potent and tenacious material of fruity character; Lemonone B, a material having a citrus-lemon odor; and Citrose No. 2, a rose-citrus-geranium type. For synthetic adhesives of the phenol-formaldehyde type, Lemonone B is particularly recommended. For polyvinyl acetate, Citrose No. 2 is very effective, as is Adhesive Odor GD-4824, a material having a sassafras-camphor-type odor.

# RUBBER WORLD

## NEWS of the MONTH

### Highlights

The rubber goods industry is expected to operate at its present high level during the remainder of the current year. No very great increase in demand is considered likely even if the special session of Congress takes early action on the program of aid to Europe. Industry leaders called for early action by Congress on a national rubber policy, with

due consideration being given to the balance between rubber in the field of national security and in the field of domestic economy. Information on the growth and progress of the URWA union in the rubber industry was made public following the union's recent annual convention. Seiberling Rubber Co. was almost entirely shut down during the first two weeks in October by an unauthorized strike.

### Industry Production Leveling off; Early Action on National Rubber Policy Requested

Indications are that the level of production in the rubber goods industry for the fourth quarter will be somewhat higher than during the third or summer quarter, but will not reach the record rate of the first part of the year. Even if Congress in its special session called for November 17 takes positive action on aid to Europe, it is not considered likely that the rubber industry will be required to expand its manufacturing operations much above the existing high level. In statements made during October, John L. Collyer, president of The B. F. Goodrich Co., and P. W. Litchfield, chairman of the board of the Goodyear Tire & Rubber Co. called for early action on a national rubber policy. Mr. Collyer recommended a thorough investigation of the effect of the prewar rubber cartels by our government in arriving at both domestic and international policies "which may arise with the advent of a large world surplus of rubbers, crude and man-made." Mr. Litchfield recommended continued government ownership of synthetic rubber plants having a capacity of 600,000 long tons of GR-S a year and the production of a minimum of 100,000 tons of GR-S to be used entirely by the tire and tube manufacturers. He also recommended a substantial government stockpile of natural rubber and encouragement by the United States of the development of natural rubber production in the Western Hemisphere to the point where 100,000 tons a year could be obtained. It was pointed out that government ownership and operation of synthetic rubber plants was an encroachment on the traditional fields of private enterprise, but that if kept to a minimum, no great difficulties should be experienced. W. S. Lockwood, in his October "Rubber Report," made special mention of the delicate balance between the world supply and demand position on rubber and warned that any major stockpiling program could create a scramble for natural rubber and a shortage of GR-S. He suggested a continuation of present controls until the supply-demand situation eased up.

#### Industry Production Leveling Off

Although the overall production rate for the rubber goods industry continued to rise slightly during October, a trend toward leveling off was reported by the Bureau of Labor Statistics in Washington. It is

quite likely that production during the fourth quarter will be at a rate midway between the record high of the first quarter and the low for the year recorded during the third quarter. Satisfaction of the pent-up demand for replacement tires and growing inventories in hands of manufacturers and dealers, in spite of the higher original equipment demand, indicate a lower rate of production for this branch of the industry during the fourth quarter. The production of mechanical rubber goods will probably remain at its present high level, aided to a certain extent by the removal of restrictions on the use of natural rubber in this type of product. Most sole and heel plants are again operating at capacity and expect to continue at this rate for the remainder of the year. Footwear plants are also very busy and are likely to continue so for several months. The production of goods from latex is increasing with the improved supply position in latex rubber. However, with the tire and tube branch, which consumes about 75% of the rubber used, planning a lower output for the fourth quarter, this reduction will more than counterbalance any increases in rubber consumption that may be achieved by other branches of the industry.

Preliminary estimates of rubber consumption during the third quarter indicate that the industry used about 260,000 long tons of natural and synthetic rubbers. Consumption during the first half was 572,000 tons, which added to the third quarter figure, gives a consumption for nine months of 832,000 tons. Estimates of consumption for the fourth quarter are 230,000 tons, a drop of between 10 and 12% from the third-quarter figure. Nevertheless consumption for 1947 on this basis would be 1,060,000 tons, or somewhat higher than earlier predictions.

In his report to the President on the ability of the United States to provide 20 billion dollars in aid to Europe over a five-year period, Secretary of the Interior Krug predicted that the rubber goods industry would have only minor problems to meet. Exports of rubber products have been at an all-time high, \$143,000,000 in 1946, and an estimated \$190,000,000 in 1947, the report states. Exports can continue at this rate without creating a problem, it was concluded.

The only product in tight supply is wide conveyor belts. The backlog of domestic demand in other principal lines has been

met, and a decline in production is imminent, according to the Krug report. The belting industry is expanding capacity somewhat, but is of the opinion that present demand is short-term and therefore considers further expansion not justified.

In its regular monthly report The Rubber Manufacturers Association, Inc., gave the production of passenger-car tires for August as 5,820,172 units and shipments as 6,174,656 units. Production of truck and bus tires for the same period was 1,344,558, and shipments 1,345,593 units. Inner tube production totaled 5,179,052, and shipments 6,498,948. The detailed report including cumulative totals for the first eight months will be found in the statistical section.

The report of the Office of Materials Distribution on rubber production, consumption, and stocks showed an increase in the consumption of natural and synthetic rubbers to 85,042 long tons, as compared with the 77,996 tons consumed in July. The August consumption was about equal to that registered for June. Consumption by type during August was given in a preliminary estimate as: natural, 46,208 long tons (including 1,459 tons of latex); GR-S, 31,415; neoprene, 2,608; Butyl, 4,471 and nitrile types, 340.

New supply and production of the various rubbers in August was: natural, 44,357 long tons (including 1,784 tons of latex); GR-S, 26,000; neoprene, 1,970; Butyl, 3,735; and nitrile types, 596.

Stocks on hand at the end of August were: natural, 130,549 long tons (including 6,952 tons of latex); GR-S, 63,874; neoprene, 6,569; Butyl, 17,488; and nitrile types, 3,362.

#### Comments on Production and Prices

Mr. Litchfield, in another of his series of "Notes on America's Rubber Industry" issued during September, compared the year 1947 with the prewar year 1939 in order to record the achievement of the rubber industry in the interests of the national economy and the individual consumer of rubber products. Production of passenger-car tires in 1947 was at a rate of 20,000,000 more units than in 1939 and truck and tractor tires at a rate of 14,000,000 more than in 1939. Today's passenger-car tires are giving substantially more mileage than those produced in 1939 and at a price to the consumer 7% less than 1939 list prices, it was added. It was also pointed out that in 1939 the American rubber industry gave direct employment to 121,000 production workers at an average annual wage of \$1,484. In 1947 the comparable figure on employment is 224,000, and the comparable figure on average annual wage is \$2,814. Total employment and annual wages are therefore up practically 100%. In 1939 the rubber industry's tax bill (federal, state, and local exclusive of excise) was \$13,000,000, as compared with 1945 (the latest available statistics) when it was \$228,000,000. Many other comparisons could be cited in proof of the unflagging efforts of the rubber industry to serve our nation and the public and to share the rewards and profits of our enterprise on the broadest possible scale. Mr. Litchfield said.

Herbert E. Smith, president of the United States Rubber Co., in a statement made early in October called attention to the fact that the motoring public will save more than \$86,000,000 on its national tire bill this year, owing to lower prices brought about by sharpened competition in the tire industry. This huge saving involves some 28,000,000 passenger and truck tires and tubes which the industry expects

to make for replacement purposes in the last seven months of this year, he said. The tire industry is keeping prices down when practically every other consumer item has sky-rocketed in cost, despite the fact that labor costs and the cost of most raw materials are much higher than before the war. Thanks to our American system of free enterprise which makes it possible for companies to engage in active competition, the consumer reaps the benefits of lower prices and better products, Mr. Smith added.

In a somewhat similar vein E. F. Tomlinson, general manager of industrial product sales for the Goodrich company, called attention to the fact that with the cost of hose and belt duck and other cotton materials used in the manufacture of industrial products now 175% higher than in 1940, the selling price of transmission, conveyor, and elevator belting is today only about 30% above prewar prices. In addition, labor costs in the industrial products division of the rubber industry are today 54.6% above 1940; while the cost of carbon black shows a 160% increase over 1940 levels.

Hydraulic control hose is 12% lower than in 1940, and other products including molded and braided hose and V-belts show increases of only 18 to 23% based on present sales prices, Mr. Tomlinson declared.

#### Statements on Rubber Policy

In the tenth of a series of studies on rubber prepared by the Goodrich company, entitled "Rubber—A Challenging World Problem" and made public early in October, President Collier advocated that appropriate United States government departments consider policies—both domestic and international—that might be adopted to "solve the economic and social problems which may arise with the advent of a large world surplus of rubbers, crude and man made."

Mr. Collier reviewed in some detail the effects of the Stevenson Restriction Scheme and the International Rubber Regulation Agreement to solve the problem of rubber supply by artificially controlling production and then stated that the American people believe in free competition. They have seen what it has done to develop the United States as the world's No. 1 industrial nation, and time and time again they have reiterated their opposition to trusts, combines, and cartels. The record of results from the cartelization of rubber in the past lends great support to this fundamental conviction of the American people, he added. However some solution must be found, and it was suggested that utilizing the facts and estimates on world rubber supply and demand, the findings of informed government agencies would throw much-needed light on the following important questions:

1. To what extent did the rubber cartels in the past stimulate or restrict international trade?
2. What was their effect on crude rubber production and employment engaged in it?
3. Did these cartels retard technological and production progress, and how did they effect the U. S. A. economy?
4. Did these cartels create economic and social frictions; if so, did they do more damage than the ills they were supposed to cure?
5. Would a new rubber cartel invite the formation of consumer groups and necessitate government supervision or participation?
6. Can the rubber problems the cartels

were designed to solve be solved in other ways?

7. Can food crops be successfully introduced into rubber-growing lands to help solve the world food problem and sustain their economies, especially during periods when rubber production might be low?

In conclusion, Mr. Collier emphasized that progress is made through producing better goods at lower and lower costs to the consumer, thus broadening markets, increasing employment possibilities, and bringing a constantly rising standard of living.

The peoples of the world should be the ultimate beneficiaries of sound world rubber policies in the form of low-cost finished products and the wider use of rubber in many applications made possible by its relatively low cost.

Mr. Litchfield, in the second of his "Notes on America's Rubber Industry" in two months, this one entitled, "America Is Ready for a New Rubber Policy," and issued in October, stated that for the first time in seven long years this country finds itself in a position to think about its rubber policy under conditions comparatively free from the pressure of grave crisis or high uncertainty. Therefore he feels we should proceed with the formulation of our rubber policy without further delay.

Our problem is so to construct our policy as to establish an intelligent, workable balance and harmony between rubber in the domain of national security and in the domain of production and use in our normal economy, he added. In the matter of national security, continued government ownership of synthetic plants having a minimum capacity of 600,000 long tons of general-purpose rubber should be established as a fundamental of our new national policy. Remaining plants may be disposed of in any manner chosen by the government. Beyond this, the government would accumulate, own, and control a substantial stockpile of natural rubber against emergencies, and, finally, the government should see to it that potential rubber growing areas in the Western Hemisphere are developed to a point where they can be counted on for a minimum yield of 100,000 tons yearly.

With regard to the matter of policy as it might relate to our normal economy, Mr. Litchfield pointed out that government ownership of synthetic rubber plants is in the nature of an encroachment on the traditional fields of private enterprise, but he felt that such encroachment could be held to the barest minimum consistent with national security. Of the potential annual capacity of 600,000 tons, the volume of actual production could be held to 100,000 tons. Since there are 900 manufacturers of rubber products in America and since 26 manufacturers of tires and tubes consume 74% of the total rubber, it was suggested that compulsory use of the 100,000 tons of synthetic rubber be confined to the tire and tube makers, thus simplifying and minimizing bureaucratic administration and control.

Attention was called to the unjustifiable disparity between the price of GR-S and natural rubber, and it was stated that a price of 15¢ a pound for GR-S should enable the government to realize an operating profit if it would, as it should, write off plant costs and not figure plant amortization in the cost of the product.

Mr. Litchfield also suggested that we will get better synthetic rubber more quickly by turning the resourcefulness of industry loose on a competitive basis than by keeping it confined through pools and cross-licensing which preclude one com-

pany from getting ahead any faster than its competitors. Pooling of skills and knowledge among the various chemical, rubber, and oil companies interested in synthetic rubber was desirable when the common danger of war provided ample incentive to our very best efforts. Now that incentive has disappeared, and it is normal and healthy for American industry to prefer the atmosphere of competition to that of collectivization, he concluded.

In his October 15 Rubber Report, W. S. Lockwood in commenting on rubber supply and demand takes a new position to the effect that for the rest of this year and most of next, world consumption and production are likely to be in so delicate balance that any major stockpiling program could create not only a scramble for natural rubber, under present consumption programming, but, more immediately important, an acute shortage of GR-S. The Armed Services, therefore, should clarify with the RFC at once the level of GR-S production necessary to prevent such a shortage. A larger GR-S production is clearly indicated for many months. At the same time the Bureau of Federal Supply, in accomplishing its natural rubber stockpiling program, should make certain that it works in close harmony with the rubber goods industry and buys in a commercial manner which disturbs the market as little as possible and also competes with the buying of the manufacturing industry as little as possible.

The Commerce Department has the responsibility to administer the limitation of natural rubber consumption and inventories so long as there is a danger of failing to meet stockpiling and essential consumption objectives.

Congress has the responsibility of making haste slowly in framing a permanent rubber policy and of continuing present control powers until we can chart a clearer course through the supply-demand uncertainties facing us.

Under present conditions the greatest responsibility lies with the rubber producers and the governments of the rubber producing countries, Mr. Lockwood explained. If they try to take advantage of the existing situation, if they do not sell freely at reasonable prices, they can write off a large slice of the American market for years to come. Everyone should discount, too, the rumors of tremendous stockpile purchases. The fact remains that the Bureau of Federal Supply, unless Congress votes more funds, has until June 30, 1948, available for rubber only that portion of \$175,000 which it can allocate to rubber among all the critical and strategic materials required for stockpiling, and which remains unspent, it was pointed out.

Nevertheless many factors, including high September rubber consumption in the United States, continued heavy purchases by "other countries," no sign of improvement in supply from Netherlands India, and combined overestimated and exaggerated reports of immediate stockpiling objectives, caused an increase in the price of smoked sheet rubber from 18 to 21¼¢ a pound the first three weeks of October.

#### No Resumption of GR-S Allocation

Earl W. Glen, Acting Chief of the Rubber Division, Office of Materials Distribution, announced on October 28 that despite rumors to the contrary, no resumption of allocation controls over GR-S is contemplated. A review of the current supply-demand relations in synthetic rubber indicate that sufficient quantities to meet total estimated requirements of the rubber industry will be available from the syn-

thetic facilities remaining in operation, Mr. Glen said.

Quarterly requirements have been diminishing, it was pointed out, following revisions of Rubber Order R-1 throughout the year. Specification changes in the September 9 amendment to R-1 will reduce further the proportionate requirements for GR-S, owing to the elimination of mandatory uses of GR-S in non-

transportation products, which policy concentrates future use of GR-S principally in transportation items.

Flexibility in the operation of the GR-S plant facilities remaining active permits sufficient expansion of production to take care of the high level of tire manufacture, which it now appears, will be sustained through the fourth quarter of this year, it was stated.

## Management-Labor Relations

Although new agreements between Goodrich, Goodyear, and U. S. Rubber and the URWA union for six paid holidays instead of a further direct wage increase at this time were reported last month, no new agreement on this problem was reported from the Firestone company during October. It is understood that negotiations are continuing and that similar negotiations between the union and The General Tire & Rubber Co., are also being held. A report on the URWA following its national convention last month, recorded a paying membership of 190,000 and a financial net worth of \$597,908. Work stoppages occurred in plants of the Goodrich company at Akron, O., and Tuscaloosa, Ala., during the last part of September. Seiberling Rubber Co. in Barberton, O., had its production drastically reduced between October 2 and 15 by a work stoppage which affected 1,700 employees. Furber Marshall, president of the Pharis Tire & Rubber Co., expressed great faith in American labor when not swayed by Communist propaganda, in a talk October 14.

### U.R.W.A. Activities

Membership in the United Rubber, Plastics and Linoleum Workers, CIO, has increased from 193,000 to 208,000 during the past year. This total, however, includes members in military service, those on the withdrawal list, and honorary members. The actual paying membership is about 190,000. The number of local units increased from 232 to 255; many of the new local unions are in the plants of the plastics industry. The union has increased its financial net worth from \$562,869 to \$597,908. It costs the international union more than \$500,000 a year to maintain its field and district offices. The URWA took part in 60 organizational campaigns and 42 NLRB elections, in which it won 31 of these elections during the past year.

Plants at which the URWA defeated the AFL in NLRB elections were: United States Rubber Co., Bristol, R. I.; Firestone Tire & Rubber Co., Pottstown, Pa.; Dur-O-Lite Pencil Co., Melrose Park, Ill.; U. S. Rubber, Washington, Ind.; Stokes Molded Products Co., Trenton, N. J.; and B. F. Goodrich Co., Tuscaloosa, Ala.

The AFL won bargaining rights at plants of Carlisle Rubber Co., Carlisle, Pa.; U. S. Rubber, Burlington, N. C.; Goodyear Tire & Rubber Co., Lincoln, Neb.; and Dryden Rubber Co., Keokuk, Iowa. District 50, United Mine Workers, AFL, won over the URWA at the Norwalk Tire & Rubber Co., Norwalk, Conn. Independent unions defeated the URWA at the plant of the Manhattan Rubber Mfg. Division, Raybestos-Manhattan, Inc., Passaic, N. J., and at the plant of E. I. du Pont de Nemours & Co., Inc., Louisville, Ky.

### Work Stoppages

A minor disagreement between 185 calender room employees and the Goodrich

company at Akron, caused a work stoppage from September 23 through 26. A strike at the Tuscaloosa plant of the same company during the second half of September kept 800 workers idle. This dispute was over a satisfactory local contract in connection with the company-wide agreement for six paid holidays reported last month.

A sitdown strike at the Seiberling plant in Barberton, which began on October 2 in the passenger tire department, finally made 1,700 workers idle. The difficulty arose from a ruling by the company which stated that workers were to be paid only 90% of their average earnings when lack of stock or other reasons prevent them from making full rates. The workers insisted on 100% payment although the contract between the company and the union called for only 90% payment of such conditions. International URWA officials termed the strike "unauthorized" and urged the local union to have its members returned to their jobs. Negotiations on the dispute began on October 16, with the resumption of full production at the Seiberling plant.

### Marshall on Labor Relations

In a talk on October 14, before the Dayton, O., chapter of the Society for the Advancement of Management, Furber Marshall, Pharis president, expressed "a great abiding faith in the common sense and justice of the great mass of labor, when they know the true facts of any given situation and are not swayed by selfish propaganda of politically ambitious labor leaders or professional trouble makers, such as Communists."

"Abuses of labor by management in the past brought on the highly restrictive and pernicious Wagner Act. Management climbed out of the public doghouse and labor climbed right in through their abuses of new-found power, swinging the pendulum to the Taft-Hartley Act," he added.

"Without certain labor leaders' careless attitude toward public health, comfort and convenience, there never would have been the support which gave Congress the strength to pass legislation in the face of threatened reprisals by highly organized labor forces."

"Good manners and pleasant mien should not be left to the home or reserved for social functions," Mr. Marshall said, "but should be utilized all day long, whether buying, selling or handling labor relations. Despite the assembly lines of industry, workers are not robots, and much of the unrest and dissatisfaction that breeds strikes comes from the mental and physical fatigue of doing only one job countless times a day."

### Taft-Hartley Act Discussed

Discussions of management-labor relations under the Taft-Hartley Act featured the personnel conference of the American Management Association on October

2 and 3. A registration of approximately 1,500 was recorded at the two-day conference, held in the Hotel Pennsylvania, New York, N. Y.

Speaking on "The NLRB and Its New Responsibilities," Paul M. Herzog, chairman of the National Labor Relations Board, told the assemblage that while it is the duty of labor to obey the new law, it is also the responsibility of business concerns to set a good example by bargaining collectively with employee representatives in good faith. Management as a whole must discourage the few "short-sighted" employers who regard the Act as a weapon to weaken labor, Mr. Herzog said. These sentiments were echoed by John L. McCaffrey, president of International Harvester Co., who spoke on "Management Policy under the Taft-Hartley Law." While the Act necessitates some minor changes in labor contract, Mr. McCaffrey said, it should not be used as the basis for an anti-union policy now.

Other speakers included Leo Wolman, of the National Bureau of Economic Research, who discussed "Labor Trends and Wage Levels," and John S. Bugas, vice president of Ford Motor Co., who spoke on "Labor Relations and Productivity." At a symposium on "How Labor and Management Are Meeting the Taft-Hartley Law," Lee Pressman, general counsel of the CIO, gave "A Union Counsel Estimate"; George B. Christensen, of Winston Strawn & Shaw, presented "A Management Counsel Estimate"; and M. S. Pitzele, labor editor of *Business Week* and member of the New York State Mediation Board, spoke on "The New Labor Law—Its Place in the Perspective of Labor Relations."

In addition to the Taft-Hartley Law discussions, the Association also held sessions on modern supervisory development, current salary administration problems, and employee education and opinion.

Theodore A. Werkenthin, principal materials engineer and civilian in charge of the rubber and plastics section of the Bureau of Ships, was recently appointed chairman of the Federal Specifications Board. Mr. Werkenthin succeeds P. L. Wormeley, who resigned that office after 21 years of service.

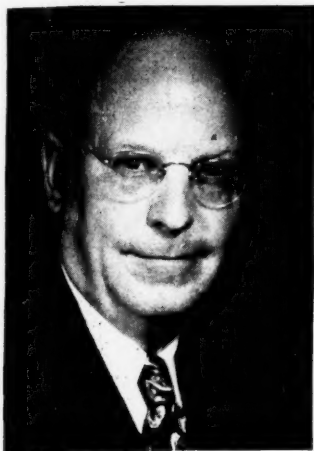
E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., recently reported production of Ludox colloidal silica, a fluid, opalescent, aqueous dispersion of silica of relatively high purity and in finely divided form. Prepared by a patented process involving the reaction of aqueous sodium silicate with a cation or base exchange resin. Ludox sols are essentially salt- and sodium-free. Upon drying, the liquid yields substantially pure silica in the form of thin films or finely divided discrete particles. Colloidal solutions of 18% silica concentrations are already available, and a 30% solution is expected to be available early in 1948. Such solutions can be stored indefinitely without any settling or gelation, but can be readily precipitated or gelled by the addition of certain salts or organic materials. The new product is now available in small commercial quantities and will be available in increasing amounts early in 1948 from the company's Grasselli chemicals department. The material is expected to find wide application in rubber compounding, surface treatments for paper, in leather dressings, etc.

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# EASTERN AND SOUTHERN



Robert L. Moore

**Robbins Tire & Rubber Co., Inc.**, Tuscumbia, Ala., has announced that Robert L. Moore, formerly of the research department, Goodyear Tire & Rubber Co., has been appointed vice president of research and development. He has specialized in the use of pigments in rubber and plastics for more than 30 years and holds patents on the thermal decomposition type of carbon.

**J. M. Huber Corp.**, 342 Madison Ave., New York 17, N. Y., has announced that C. A. Carlton, technical director of the company's rubber and new products division, is now in England on the first lap of an extensive tour of the Continent to survey the European rubber manufacturing industry. Mr. Carlton is particularly interested in observing at first hand the postwar outlook of European tire manufacturers and appraising their requirements for carbon black. He will confer with the technical staffs of rubber manufacturing plants in Sweden, Holland, Belgium, France, Italy, and Switzerland and is expected to return to the United States late in November.

**Westinghouse Electric Corp.**, East Pittsburgh, Pa., has made John E. Payne manager of all industry sales departments, with general overall responsibility for sales of equipment to all industries. R. S. Kersh succeeds Mr. Payne as manager of industrial sales. Mr. Payne, with the company since 1925, attended the student training course, worked in the general engineering department, and was industrial salesman in the Pittsburgh office (June, 1927-March, 1933), manager of the machinery resale section (until July, 1934), manager of industrial sales for the central district (until February, 1947), and then manager of industrial sales (until his new promotion). Mr. Kersh came to Westinghouse in 1930, completed the graduate student course, was assigned to the Atlanta, Ga., office in February, 1931, was transferred to the Birmingham, Ala., office in November, 1931, was returned to East Pittsburgh in the resale machinery section in 1938, and was made manager of the Houston, Tex., office in 1942.



T. M. Gross

**H. Muehlstein & Co., Inc.**, 122 E. 42nd St., New York 17, N. Y., has announced that T. M. Gross has joined the staff of its Akron, O., office. Mr. Gross was formerly associated with the Loewenthal Co. for 25 years, handling dealer operations and as manager of Loewenthal's East St. Louis office.

**Hamilton Rubber Mfg. Corp.**, Trenton 3, N. J., has opened branch office and warehouse at 2017-19 Preston Ave., Houston, Tex., which is under the direction of W. A. Olivier, recently named general manager of Hamilton's southern division. He has been closely associated with many industries in this area for the past 28 years. Lex O. Carmichael is assistant branch manager. The Houston warehouse will be stocked with a complete line of Hamilton industrial rubber products including transmission, conveyor, and elevator belting, all types of industrial hose, all types of petroleum handling hose, fire hose, packings, molded products, and oil field specialties.

**Controllers Institute of America**, 1 E. 42nd St., New York 17, N. Y., has announced that Alden C. Brett, of Hood Rubber Co., Watertown, Mass., was named a director of the Institute at its sixteenth annual meeting on October 19-22 at the Drake Hotel, Chicago, Ill.

**W. T. LaRose & Associates, Inc.**, Troy, N. Y., manufacturer of Thermall electronic heat generators, has announced that a complete laboratory is now maintained with a staff of qualified electronic engineers who devote their full time to experiments and tests to determine the possibilities and advantages of Thermall equipment for various applications. Work is being done on electronic heating for heat-sealing thermoplastic materials, for drying wood and wood products, for curing adhesives, for edge gluing for curing rubber items, and for drying paper, textiles, printing inks, and many other products. Hundreds of tests have been completed at no cost to the customer, and the facilities are available to any interested industry.

**U. S. Rubber Reclaiming Co., Inc.**, 500 Fifth Ave., New York 18, N. Y., according to President Jean H. Nesbit, has appointed J. R. Nesbit company representative in the Canadian and Ohio territories. Mr. Nesbit was formerly with the Continental Carbon Co. since 1940, except for a period of about three years which he spent in the Armed Forces. He is a graduate of the Carnegie Institute of Technology with a degree in chemical engineering.

**Houdry Process Corp.**, Philadelphia, Pa., according to C. G. Kirkbride, manager of the laboratories, has appointed Alex G. Oblad as director of chemical research and Jack C. Dart as director of development. Both men will make their headquarters at the Houdry laboratories near Marcus Hook, Pa.

D. Oblad, a graduate of the University of Utah where he obtained his doctor's degree in physical chemistry, has worked chiefly in the fields of hydrocarbon catalysis, chemical thermodynamics of hydrocarbons, and physical methods of analysis. He has held positions with Standard Oil Co. (Indiana), Magnolia Petroleum Co., and the Texas State Research Foundation. He was also counsellor of the Dallas-Fort Worth Section of the American Chemical Society and has served on various committees.

Mr. Dart earned an A.B. degree from Albion College before continuing studies at the University of Michigan where he received his bachelor's and master's degrees in chemical engineering. His former employers were Pan-American Refining Corp., Magnolia Petroleum, and Standard Oil Development Co. A member of the American Chemical Society and two honorary engineering societies, he is also on the program committee of the American Institute of Chemical Engineers and was this year chairman of the Institute's Baton Rouge Section.

**G. S. Ziegler & Co.**, New Market, N. J., through General Manager G. S. Ziegler, has announced the expansion of its business to cover the field of compounding ingredients for natural and synthetic rubbers, featuring activation acids, detackifiers and other processing aids, especially cure-activated plasticizers. E. A. Van Valkenburgh, who has had broad experience in rubber manufacturing as well as in the development and sale of rubber chemicals, has joined the Ziegler organization with headquarters in the Woolworth Building in New York, and will be head of this division and available for technical advice and service. The Ziegler company has extensive laboratory facilities at its large, modern compounding plant in New Market.

**Ameco Chemicals, Inc.**, has closed its sales offices in the Lincoln Bldg., New York, N. Y., and transferred offices and manufacturing plant to Henderson, Nev. Ameco has disposed of its plant at Rochester, N. Y., has acquired the B.M.I. plant of Hardesty Chemical Co. at Henderson, and will manufacture synthetic detergents, chlorinated organics, and synthetic organic chemicals which this plant is equipped to produce on a large scale. The company will primarily endeavor to serve the western markets and has appointed Robert W. Fredericks sales manager and Ernest B. Rubloff technical sales development director. The company exhibited in the Pacific Chemical Exposition last month.

## Rice, Graham Head Synthetic Rubber Plant Staffs



Philip E. Rice



George A. Graham

United States Rubber Co., Rockefeller Center, New York 20, N. Y., recently announced the formation of a staff to operate the government synthetic rubber plant in Borger, Tex. John P. Coe, vice president and general manager of the company's synthetic rubber division, said that new supervisory personnel for the plant had been drawn from the company's plants in Institute, W. Va., and Los Angeles, Calif., the latter of which has been shut down. George A. Graham, manager of the Institute plant since its inception in 1942, was named factory manager at Borger. He is succeeded at Institute by Philip E. Rice, until now factory manager at Los Angeles. J. Warren Braley has been transferred from Los Angeles to become production superintendent at Borger. Carl W. Walden, from Los Angeles, is chief chemist. Three other men from Institute on the new staff are T. A. McCoy, plant engineer, Robert E. Waite, industrial relations manager, and Oscar Zellweger, control manager. About 30 other men from Los Angeles and Institute will take up positions as supervisors and technicians on the new staff. Some of the personnel previously on The B. F. Goodrich Co. staff, former operators of the Borger plant, are being retained on the U. S. Rubber staff, Mr. Coe added.

U. S. Rubber has appointed Arthur W. Rista manager of friction tape, jar ring, and plumbing specialty sales. He succeeds E. F. Brownworth, who is retiring after 37 years of service. Mr. Rista has been with the company 29 years, most recently as Mr. Brownworth's assistant.

John W. Solomon, former owner and manager of Marjon Fashions, Sylacauga, Ala., has been appointed general sales manager of the textile division of U. S. Rubber. His appointment follows expansion of this division and the development of new postwar products, including Strex, Ustex, Asbestos, and Carosel fabrics. Mr. Solomon will be responsible for the sales of the new products and also cotton yarn, combed yarn, and other textiles manufactured for industrial use and the textile trade. A graduate of Alabama Polytechnic Institute, Mr. Solomon was a vice president of Avondale Mills before owning Marjon Fashions, which he recently sold to Halamar Garment Co.

The Gillette Tires division has named J. W. Carpenter and A. B. Chapman

assistant sales managers, according to H. C. McDermott, Gillette sales manager. Mr. Carpenter joined the rubber company in 1936 as a tire salesman in Dallas, Tex., and was later appointed assistant district manager there in 1939. In 1942 he became district manager of jobber sales for the Memphis, Tenn., district, and in 1944 district manager for Gillette at Memphis. In his new capacity Mr. Carpenter will have headquarters at the company's general offices in New York.

Mr. Chapman was first employed by the company in 1929, as manager at Los Angeles. He resigned that post in 1935, but rejoined the company in 1938. The next year he was made division manager of G&J tire sales at San Francisco, Calif., and later became district manager for Gillette tires at Los Angeles. In his new position Mr. Chapman will be in Los Angeles.

For the first time since the war, a survey party for purposes of appraisal was permitted to enter the plantation of U. S. Rubber in Sumatra on October 19, it was announced by Herbert E. Smith, company president. The U. S. Rubber plantations in Sumatra, developed over a period of 30 years, consisted of 72,821 acres containing approximately 7,000,000 trees and yielded about 50,000,000 pounds, dry weight, of rubber per year. These properties were occupied by the Japanese on March 12, 1942, and were written off as a war loss in that year. Whether or not the company will repossess the plantations will depend on many factors still to be determined, including prospects for a local government that will be stable and permit orderly and profitable operations. Other factors are the present condition of trees and equipment, rehabilitation costs, and availability of the large labor forces required.

### Hewitt Belting Program

Hewitt Rubber Division, Hewitt-Robins, Inc., Buffalo, N. Y., has resumed production of its top brand Maltese Cross fire and chemical hose, which was discontinued during the war. J. H. Hayden, vice president in charge of sales, said the lifting of government restrictions and the availability of special long-staple cotton necessary to produce the high-tensile duck

have enabled Hewitt to reinstate the pre-war brand of hose. Some of the features of the hose which have contributed to its outstanding record during its half century of usage include: use of special duck which makes the hose light in weight and easily coiled and gives high burst resistance; a special chemical treatment to protect the duck against deterioration by mildew, while the rubber cover eliminates the necessity of drying after use; and a high-quality rubber tube and cover compounded to withstand oiling for long periods without cracking and to protect the duck carcass from acid fumes and oil.

Hewitt also announced improvements in its line of flat transmission belting, with current production featuring the return of Monarch Amber belting, discontinued during the war. According to J. H. Hayden, vice president in charge of sales, Hewitt is now producing four top brands of transmission belting: Monarch Amber, Monarch Neoprene, Sagamore, and Ajax. Monarch Amber is of straight-edge construction, extremely flexible, and is built of premium grades of extra-strength hard silver duck. All plies are insulated with highest-quality pure gum rubber compound. The belt is recommended for heavy-duty drives where especially heavy stock loads, brutal service, or abuse conditions are encountered. Monarch Neoprene is of the same general construction as Monarch Amber, but uses neoprene rather than natural rubber. This belting is exceptionally well suited for heavy-duty service where oil conditions are especially severe.

Sagamore belting is made of pre-stretched premium-quality hard silver duck plies frictioned and skimmed with high-quality pure rubber compounds. It is made in the folded-edge construction for use on crushers, saw mills, and other heavy-duty operations. Ajax is a top-quality folded-edge transmission belting made of high-tensile duck, frictioned and skim coated with first-quality rubber compound. It is recommended for medium-duty service, but may be used for the more severe services where extremely long service life is not required. All four transmission belts are made endless by a special "drum-splice" method and are available in 500- to 550-foot rolls.

Hewitt is also offering two grades of agricultural spray hose, Monarch and Ajax, both built to withstand working pressures up to 800 p.s.i. Monarch brand is made with a special oil-resisting synthetic rubber tube to withstand emulsion sprays; while Ajax brand is the non-oil resisting type. Both brands are compounded to resist the deteriorating effects of insecticides, solvent solutions, etc., as well as abrasion, weathering, and sun-checking.

Hewitt also has appointed James D. Waser manager of the division's molded goods sales.

**Woburn Chemical Corp. (N. J.),** 1200 Harrison Ave., Harrison, N. J., has appointed C. E. Williams assistant sales manager. He had joined the sales department upon his release from the United States Army Air Corps.

Woburn also has promoted C. George Taylor to the assistant sales managership in charge of the export division. A graduate of McGill University, Mr. Taylor joined the company in 1938. He served in the Navy from 1942 to 1946 and was previously in charge of coordination of the Woburn also has promoted C. George town, S. C., and Moore Haven, Fla.

**United Engineering & Foundry Co.,** Pittsburgh, Pa., has been approved to sponsor an Ordnance Medium Maintenance Co. under the War Department Affiliation Program, wherein civilian organizations will sponsor certain key service-type units of the Organized Reserve Corps. The purpose of these reserves is to provide effective operating units of an administrative or technical nature for immediate mobilization in the event of a war. United Engineering will sponsor a Class A Unit, i.e. a unit with a full complement of officers and enlisted men, which will be organized at the company's New Castle, Pa., plant. Training schedules are provided by the War Department, together with necessary instruction, clothing, and equipment. A meeting place and storage facilities for the equipment will be provided by the sponsor. This particular unit will be trained in various types of maintenance and repair services.

**Calco Chemical Division,** American Cyanamid Co., Bound Brook, N. J., through M. L. Crossley, director of research, announced the appointment of Robert S. Long as an assistant director of the organic section of the research department. A graduate of St. Mary's College, Dr. Long received his Ph.D. from the University of Illinois and joined Calco in 1940. In 1944 he was appointed an assistant chief chemist of the organic section and held that position until his present promotion. Dr. Long is a member of the American Chemical Society, the American Institute of Chemists, Sigma Xi, and Gamma Alpha.

On October 12, August Merz, dean of Cyanamid employees, completed 50 years of service with the company and its affiliates. Mr. Merz, at 74, is looking forward to continued service in his capacity as research adviser and consultant. In 1897, Mr. Merz joined Heller & Merz, dyestuff manufacturers, and rose to the position of general manager of that company. In 1929, Heller & Merz was purchased by Cyanamid, and Mr. Merz was made a vice president of Calco when Calco assumed operation in 1930. A graduate of Cornell University, Mr. Merz did graduate work at Cornell and abroad. A member of many technical and professional associations, Mr. Merz has been particularly active in the American Chemical Society.

## OHIO

### Promotions at Goodrich

Allan O'Neal, with The B. F. Goodrich Co., Akron, since 1929, has been named manager of the company's plant in Clarks-ville Tenn., to succeed C. R. Spencer, resigned. The plant mainly manufactures rubber soles and heels.

Mr. O'Neal, a native of Bainbridge, Ga., and a graduate of Georgia Tech, worked in the company's general laboratories in Akron before his graduation, returning to the Akron laboratories in 1933. He was assigned to the research laboratories in 1934 and to technical service, processing division, in 1935. After brief service in the industrial products division in Akron, Mr. O'Neal was transferred to the Clarks-ville plant as assistant technical manager in 1940, becoming technical manager two years later.

In 1946 he attended special courses in Harvard Graduate School of Business Administration, going to the company's Oaks, Pa., plant later that year as general foreman of the processing division.

A new division, the plastic materials sales division, has been established by Goodrich, and L. H. Chenoweth named general manager. This division will handle sales of all plastic materials the company handles, including Koroseal. Mr. Chenoweth, a graduate of Harvard, joined Goodrich in 1914 in the industrial products sales division. He held many executive posts in that division and since 1943 headed the company's plastic materials sales, which until now have been included in the industrial products division.

Carmen F. Newland has been appointed manager of the Kansas City district of the industrial products sales division. A graduate of the University of Kansas, Mr. Newland has been with Goodrich two decades, mostly in tire sales.

William E. Ireland has been named merchandise manager of the International B. F. Goodrich Co. He had been manager of replacement passenger-car tire and tube sales for the parent company. Mr. Ireland joined B. F. Goodrich in 1934 following his graduation from Ohio Wesleyan University. He first was assigned to the associated tire lines division, in which he held various sales positions until 1942, when he was transferred to the automotive, aviation, and government sales division with headquarters in Washington, D. C. In October, 1943, Mr. Ireland was loaned to the War Production Board as chief of

its tire and tube production division, and he continued as a government consultant on tires after returning to his company in 1945.

Three Akron employees of the Goodrich company have been assigned to the Holland rubber plant with which the company has become associated, N. V. Nederlandsch—Amerikaansche Autobandenfabriek, in Enschede, a suburb of The Hague. R. J. Hull has been named factory manager, M. C. Pierce, technical representative in tire construction, and O. J. Dahl, technical representative in compounding. Mr. Hull has been production manager of several departments in the Akron tire plant, Mr. Pierce, manager of truck and bus tire development, and Mr. Dahl a technician in the tire division.

Chester A. Capron, in the Goodrich processing division for the last half century, retired October 1. He is believed to have one of the longest records for service in the compounding branch of the rubber industry. He completed his 50 years without a lost time accident and was specifications foreman at the time of retirement. During his career he made several trips to foreign companies with which the company was associated as an adviser on compounding problems.

David M. Goodrich, chairman of the board of the Goodrich company, was guest of honor at a dinner given recently by the directors and officers in New York, N. Y., commemorating his 20 years as board chairman. President John L. Collyer was toastmaster. Mr. Goodrich, son of the company's founder, was elected board chairman in 1927 although he had been associated with the company before that date.

### Timken Advances Several

H. C. Edwards, chief engineer of research and development, has been appointed director of research and development, succeeding J. F. Leahy, who retired October 1 after 45 years with The Timken Roller Bearing Co., Canton 5. Walter F. Green, assistant manager of research and development, became manager of research and development.

Mr. Leahy, who began with Timken in 1902, assumed charge of its experimental department 27 years ago. When the division of research and development was created in 1943 and housed in a separate building with greatly expanded equipment and facilities, he was put in charge.

Mr. Edwards, after many years with automobile and airplane manufacturers, joined Timken in 1935 as chief engineer of Diesel fuel injection equipment and in 1941 was put in charge of special radial bearings. He was chief engineer of research and development in 1943.

After working a few years for the New York Ice Machinery Co. and then The Hoover Co., Mr. Green in 1935 was hired for the Timken experimental department. That same year, however, he was transferred to the works engineering department as a tool designer and later, a machine designer. Then in 1941 he was named assistant works engineer. In 1945 he was transferred to the division of development and research as assistant manager.

H. M. Shank, Boston branch manager of the service-sales division of the Timken company, has been appointed Detroit branch manager to succeed J. D. Jesseph, who resigned to enter the automotive parts



New Pacific Coast Plant of American Anode, Inc., in Los Angeles, Calif.  
Now in Operation

agency business. Frank M. Barry, a field representative in the New York office, has been assigned the Boston branch managership.

Mr. Shank was first employed by Timken in February, 1934, as representative in the Philadelphia office and became manager of the Boston branch four years later.

Except for his service in the Quartermaster Corps during the war, Mr. Barry has been with the company since 1924 in various sales capacities, first in Boston and then in New York.

### Changes at Mansfield Tire

The Mansfield Tire & Rubber Co., Mansfield, recently announced four appointments involving new positions and key persons in the company.

C. C. Warner, for eight years advertising and sales promotion manager, has been transferred to the field sales executive staff, becoming district sales manager for the area embracing Colorado, Wyoming, Utah, New Mexico, Arizona, Montana, Idaho, and El Paso, Tex. His headquarters will be in Denver, Colo. Mr. Warner has been with Mansfield since May 27, 1939, after having been in sales and advertising activity with Seiberling Rubber Co., Dayton Mfg. Co., Phillips Petroleum Co., and Continental Oil Co.

Assigned to Mr. Warner's former post is H. L. Mahoney, who comes to Mansfield from The B. F. Goodrich Co., where he had been advertising and sales promotion manager of the associated lines division. Mr. Mahoney's other experience in sales and advertising was gained at Seiberling and the Goodyear Tire & Rubber Co.

Newly added to the Mansfield field sales executive staff is W. J. Jarman, who becomes district sales manager for Wisconsin, Minnesota, North and South Dakota, and the upper peninsula of Michigan. He had previously been with Kelly-Springfield Tire Co. and for 16 years had been a truck tire salesman and a district manager for Goodrich in Chicago and Minneapolis.

In the new position of manager of farm tire sales is Frank R. Mathews, until recently chief of production of the rubber division of the United States Department of Commerce in Washington, D. C. During the war years Mr. Mathews was with the War Production Board in charge of scheduling production of tires and tubes for military and Lend-Lease requirements. He also directed allocations of natural and synthetic rubber.

**Frank A. Seiberling**, chairman of the board, Seiberling Rubber Co., Akron, on October 6 marked his eighty-eighth birthday. Company and community planned many festivities in celebration of the event, but the dean of the rubber industry rejected most such activities because of his advanced years. He does, however, work an average of five hours daily at the company's plant in Barberton.

**Battelle Memorial Institute**, Columbus 1, has added to its staff John B. Dennis, chemist, who will be engaged in research in rubber technology. Mr. Dennis holds a B.A. degree from Indiana University and is a member of the American Chemical Society, Phi Beta Kappa, and Phi Lambda Upsilon. He was formerly associated with The B. F. Goodrich Co.

## Goodyear Announces Organizational Appointments

Important organizational appointments within the chemical products production division, The Goodyear Tire & Rubber Co., Akron, have been announced by Russell DeYoung, vice president in charge of production. This division, covering the manufacturing of chemicals, films, plastics, synthetic rubbers, etc., was established in February, 1947, headed up by H. I. Belknap, reporting to Mr. DeYoung.

Effective October 1, the manufacturing of Airfoam will become a part of this division.

G. H. Barnes, manager of Airfoam development at Plant 3, will report to Mr. Belknap in a similar capacity with his duties extended to development work for the company's production units now being installed at the special products division (formerly Plant C, GAC and recently purchased from the government by Goodyear).

Charles H. Maxwell, Airfoam development, Plant 3, has been named Airfoam production superintendent at Plant 3, and J. T. Richardson, division foreman on Airfoam, has been named Airfoam production superintendent at the special products plant. Mr. Maxwell will report to Mr. Belknap, and Mr. Richardson will report to H. R. Child, recently named plant manager at the special products plant.

At the same time F. J. Carter, director of personnel, announced that David H. Doner, Plant 2 Efficiency, has been transferred to the special products division as personnel manager, reporting to Mr. Child.

Mr. Belknap came to Goodyear in December, 1919, assigned to tire design work. Earning himself a reputation as a "trouble shooter" on design and production problems, he was eventually assigned to Java to head up plant operations there. He remained there from 1934 until March, 1938, when he was returned to Akron as assistant to the general superintendent.

A year later he was named production superintendent at Plant 1 and later that same year was placed in charge of Airfoam operations. In January, 1942 he went to the St. Marys plant as general superintendent, returning to Akron in August, 1942 to be plant superintendent of Plant C, Goodyear Aircraft Corp.

Mr. Barnes became affiliated with the company as a research chemist in 1923, a year after his graduation from Massachusetts Institute of Technology. Engaged in special chemical research for a number of years, he was placed in charge of development activities on frothed sponge rubber in 1936 and was named manager of Airfoam development in 1940.

Mr. Maxwell became associated with Goodyear in 1927 as a mechanical goods compounder. In 1930 he was transferred to Australian operations, where he remained until 1946, when he was returned to Akron as a section head on mechanical goods design. In October of that year he was assigned to Airfoam development.

Product of the Goodyear flying squadron, Mr. Richardson has been with the company since June, 1929, progressing through mechanical goods department and division foremanship to his new position.

Mr. Doner was first employed by Goodyear in 1928 as a tire builder, later transferring to the production squadron. In 1937 he was sent to the Jackson, Mich., plant on supervisory training and in 1940 was assigned to the personnel division of Goodyear Aircraft. During the war he set up personnel departments for branch plants at Millersburg and Uhrichsville, O.,

where he remained as personnel manager until operations in those towns were discontinued. Then he was named labor manager at Plant D, Akron.

A. W. Biggs has been named acting manager of the builders' supply and flooring department, chemical products division. He succeeds Otto C. Pahline, who resigned after 33 years' service with Goodyear to enter another business. Mr. Biggs was assistant manager of the department since 1945. Native of Newark, O., and a graduate of Miami University, Mr. Biggs has been affiliated with the Goodyear organization since 1928. He was first in the tire production division, and later transferred to the mechanical goods division. Then in 1941 he was made night superintendent of all Goodyear-Akron plants and a year later became manager of the fuel control division, subsequently assuming his duties in the builders' supply and flooring department.

J. H. Stephens has been named assistant manager of the storage battery and brake lining department at Goodyear. He succeeds K. D. Kienth, who resigned to re-enter the army as a major. Mr. Stephens joined Goodyear as a member of its export company in February, 1925, following his graduation from Ohio State University with a degree in foreign commerce. In October, 1929, he was appointed general line salesman in Detroit and served in various sales capacities prior to his transfer to the tractor tire sales department in March, 1939. He was farm tire representative at Columbus before being named district manager of aviation products at Cumberland, Md., in 1941. In April, 1946, he was selected to assist in preparation of a dealer merchandising school program for the company in Akron. He was later named conference director for the Baltimore and Richmond districts, where he supervised the work of 41 conferences.

Mr. Kienth joined Goodyear after his graduation from the University of Kansas in 1927. He entered the Army Air Forces during World War II.

William E. Still has been appointed director of the Soil Conservation Awards program for the Goodyear company, according to C. L. Metzger, manager of farm tire sales. Mr. Still's duties will include the coordination of sales promotion, advertising, and publicity for the program, announced by the company in June. Contestants are farmers and members of governing bodies of soil conservation districts in Ohio, Indiana, Michigan, Missouri, Minnesota, Wisconsin, Illinois, and Iowa. Top awards are winter vacation trips to Goodyear Farms near Phoenix, Ariz., center of the company's experimental work in agriculture.

Mr. Still joined Goodyear in 1937 as a budget trainee, later serving as budget manager of the company's stores in Erie, Pa., and Geneva and Rochester, N. Y. He was named field representative at Albany in 1943, a post he held until January, 1947, when he became instructor of the company's dealer merchandising conferences at New York, Newark, and Philadelphia.

Walter E. Shively, manager of tire design for Goodyear, was presented the gold medal of the Litchfield Special Award of Merit on October 7 in recognition of his efforts in directing development of the company's recently announced Super Cushion tire. P. W. Litchfield, board chairman, made the award before an assemblage of 1,600 employees in the company's theater. The award to Mr. Shively

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was the fifth to be made for technical accomplishment since the establishment of the award in 1928, although nine awards have been made to employees for conspicuous and heroic action. Born in Cleveland in 1892, Mr. Shively was graduated from the Webb Institute of Marine Engineering & Naval Architecture, New York. He joined Goodyear in 1915 as an experimental draftsman. After becoming head of the mold design division in 1916, he was in charge of truck tire design from 1917 to 1920. Following two years as head of tire design and compounding, Mr. Shively was promoted to manager of tire design, a position he has held since that time.

Edwin F. Pierce, since 1944 rim plant superintendent at Goodyear, has accepted an invitation to participate in the twelfth advanced management program sponsored by Harvard University's Graduate School of Business Administration, Cambridge, Mass. A concentrated course of study for experienced managers in the field of business management, production engineering, personnel and labor relations, the program originated during the war. Participation is restricted to representatives of various business and industrial firms selected by the University. A mechanical engineering graduate of Purdue University, Mr. Pierce joined Goodyear in 1926 and spent several years in personnel work. He was manager of the company's efficiency division before his appointment as rim plant superintendent.

Mark J. Sturtevant, manager of coated fabrics development for Goodyear has been awarded a certificate of commendation by Vice Adm. E. W. Mills for outstanding service to the United States Navy during World War II. In a letter accompanying the certificate, Admiral Mills, who is chief of the Bureau of Ships, wrote Mr. Sturtevant.

"This award is made for your outstanding accomplishments in the development of designs for inflatable landing craft and decoy targets for the United States Navy, and in particular for your development of new techniques and methods which reduced the time of manufacture and improved the quality of these craft."

An engineering graduate of Ohio State University and Massachusetts Institute of technology, Mr. Sturtevant joined Goodyear in 1935 as a development engineer.

Vice President J. M. Linforth on October 7 received from Mr. Litchfield his 25-year service pin at a luncheon in honor of the veteran executive.

C. O. Bell, manager of the Goodyear landing gear and flight operations department, has been named a member of the National Aeronautic Association Contest Board, which is responsible for the control of all flight competition sponsored by the NAA and is under the direct supervision of Arthur I. Boreman, president of NAA. A pilot of long standing, Mr. Bell holds a CAA commercial pilot's certificate. He joined Goodyear in 1929 as a pilot and sales engineer and served as such until he

was named to his present position in 1941. Prior to coming to Goodyear he had been a pilot for a commercial airline and was manager of his own fixed-base airplane operation.

Foreign representatives of Shell Oil Co. on a good-will mission to the United States recently visited Goodyear's Akron plant as part of a scheduled tour of the world's large industrial organizations. The main purpose of the mission is to contact leading industrialists, observe large-scale production methods, and keep abreast of latest manufacturing trends. In addition to the United States, various other countries are on the itinerary. The Goodyear visit included inspection of the company's "Story of Rubber" exhibit in Goodyear Hall and a look at the Car and Home Merchandising Laboratory in that building. After lunch there was a stop at the company's research laboratory and a tour of the main Goodyear plant.

The quick drying characteristics of Pliolite S-5 paints, in contrast to those of oleoresinous and phenolic coatings, will be featured by Goodyear at the annual Paint Industries Show at Atlantic City, N. J., November 7 to 11. Herman R. Thies, manager of Goodyear's plastics and coatings department, chemical products division, announced that these quick drying qualities, an essential in industrial and concrete paints, will be graphically demonstrated at the show. Goodyear will be represented at the show by Mr. Thies, W. H. Aiken, assistant manager of the plastics and coatings department, and by department representatives from all parts of the country.

A new type of engraving gum featuring a red strip ply to facilitate uniform stripping of non-printing areas has been announced by Goodyear's mechanical division. Designed especially for the box, bag, and paper products printing industry, the new gum is of standard three-ply construction with an additional inner strip of acid and oil resistant rubber. This special insert made of rubberized fabric permits the hand engraver to strip cleanly without peeling, regardless of cutting depth, according to E. R. Coate, of Goodyear's printers supplies department. Available in two styles, blue-gray or black face with either friction or buffed rubber backing, the red strip gum is being produced in 40-inch widths, five yards long, in both 1/4 and 5/16-inch gages. Durometer hardness ranges from 25 to 75.

Goodyear's new tire, tube, and mechanical goods factory in Uitenhage, South Africa, is situated on a 67-acre site converted from wild overgrowth. The factory represents a \$4,000,000 investment and is the company's fifteenth foreign operation. Covering 250,000 square feet of floor space, the factory buildings utilize 2,000 tons of steel, 85,000 square feet of glass, and 22,000 feet of power cable. Already in operation and employing 1,000 South Africans, the factory was formally opened recently by Mr. Litchfield and officials of the South African Government.



Edward V. Osberg

### Osberg with General Tire

The General Tire & Rubber Co., Akron, has announced that Edward V. Osberg has become associated with its executive sales staff. In his new position Mr. Osberg will be stationed in Akron, the headquarters of General's research and development departments, and will promote the sale of carbon-black masterbatches developed by General during the war. A program will be set up to assist rubber manufacturers to take full advantage of these combinations made from GR-S and various types of carbon black.

Before joining General Tire, Mr. Osberg was a sales executive with Wilmington Chemical Corp. and prior to that was executive editor of *INDIA RUBBER WORLD*. Earlier he had been associated with Simplex Wire & Cable Co. Mr. Osberg is a member of the American Chemical Society, the American Institute of Physics, and the Chemists' Club.

### Machinery to South Africa Plant

F. Howard Smith, assistant export sales manager for General, has joined the executive staff of the General Tire & Rubber Co. of South Africa, Ltd., which will soon begin manufacturing General tires and tubes at its new plant in Port Elizabeth. Active in export operations for 25 years, Mr. Smith has been in the tire business for two decades and recently received his 10-year pin from General. A graduate of Cambridge University in England, Mr. Smith's first export assignment was as director of sales in the Burma, India, and Ceylon area. He has literally toured the world in carrying out General tire sales assignments and is a veteran of both world wars.

Expensive and vital tire building equipment for the new General Tire & Rubber Co., South Africa, Ltd., plant was loaded aboard a flat bottom for the first portion of its trip from Akron to Port Elizabeth, South Africa. Heavy crane equipment was required to load the 34,650 pounds of machinery, including tube presses for curing tubes, calendar cooling rolls, and windup machines. Shippers estimated that the machines would be hauled the 6,000 miles in six weeks, arriving at Port Elizabeth via boat late in October.

Now nearing completion in construction, the South Africa plant will be one of the most modern tire factories in the world. It will be equipped with the automatic



Goodyear's New Tire, Tube, and Mechanical Goods Plant in Uitenhage, South Africa ("Bande" Identification Is Dutch for "Tires")

tire building machines which General's engineer, Walter Breth, perfected three years ago.

Chairman of the board of the South Africa General Tire affiliate is Charles A. Colere, who also is managing director of the \$20,000,000, Williams, Hulls, S. A., Ltd., distributor for General Motors and Consolidated Vultee Aircraft Corp. in South Africa.

Representing the Akron, O., office of General Tire on the executive staff of the South Africa company is F. Howard Smith.

**Swan Rubber Co.**, Bucyrus, has announced that new plant facilities to increase production capacity by about one-third have been completed. Garden and automotive hose will be manufactured in the plant for distribution throughout the country. The four-story building, constructed as an addition to existing facilities, is a reinforced concrete structure with brick walls.

**The Oak Rubber Co.**, Ravenna, reports that now back on the market are many of the popular prewar Oak-Hytex balloons and novelties, including Mickey Mouse heads with inflatable ears and toss-ups with full body, head, and ears; Nobbys; Spirals, Serpentine; Skimmies; and football balloons. The company also enjoyed an excellent demand for Halloween balloons and is now very busy on the Christmas varieties.

## MIDWEST

### Auburn Broadening Field

Auburn Rubber Corp., Auburn, Ind., has added several new products to the toys, soles, shoe findings, and household goods it has been manufacturing since 1910. Added to its playthings is a line of inflated balls, on which a good backlog of orders already exists.

Among the new household products are kitchen stove protector mats, drainboard mats, stair treads, and related items. Markets for these have been found in Auburn's usual channels, variety chain-stores, hardware jobbers, and general merchandise wholesalers.

The mechanical goods division at the factory has also been very active. Products now include extruded tubing for specialty bushings; lathe cut gaskets for fuel and food containers and for automotive use; all kinds of molded items, such as shock absorber bushings, spring shackle bushings, mirror mountings, garbage disposal units, suction cups, and automobile items as pedal pads, lamp mountings, and breather caps. Also made at Auburn are sheets for die cut gaskets.

The company also has several other new items in preparation including high-quality wear-resistant soles of rubber and plastic composition; and two box sets of toys, a farm set and a tool kit of rubber play tools.

Auburn officials state that toys and shoe soles will continue to comprise its main production items, but much is expected

from the addition of household goods and industrial rubber products to the regular production lines.

Auburn Rubber during the past year added an engineering laboratory to its local plant for developing new processes and products. Also added were special mold equipment and machinery for the new mechanical rubber goods. Most of the toys offered by the company are made at its factory which is located in Connellsville, Pa.

### List of Surplus Plants

The War Assets Administration has issued a list of 51 war surplus industrial plants available in Midwestern Zone 3, comprising Illinois, Wisconsin, Minnesota, Indiana, Kentucky, Ohio, Pennsylvania, and Michigan. Most of these plants are adaptable to general manufacturing purposes. Each plant listing gives the WAA regional office to which inquiries should be directed, the name of the plant, its location, the area of the building and its land, the production machinery available, the plant's former use, and purposes to which it is adaptable. The listing includes the rubber pilot-plant at Louisville, Ky., the du Pont neoprene plant at Louisville, the Firestone truck rim plant at Cambridge, O., and the Goodyear Aircraft warehouse at Akron, O., among others.

Trade and business organizations, banks, real estate boards, and chambers of commerce in the eight states are cooperating in the effort to get the facilities quickly into private hands for productive use. Copies of the listing, Catalog No. R-1386, may be obtained from these sources or from the War Assets Administration, Real Property Office, 327 South LaSalle St., Chicago 4, Ill.

### Monsanto Promotions

Monsanto Chemical Co., St. Louis, Mo., has announced also the promotion of Herbert J. Krase and Sylvester M. Evans, who both have been given the title of assistant director of the patent department.

Mr. Krase joined Swann Chemical Co. in 1929 as patent attorney and continued as such when Swann was taken over by Monsanto, working for Monsanto's phosphate division until 1940. Then he was placed in charge of the patent department at the central research department, Dayton, O., where his headquarters will remain.

Mr. Evans joined the patent department of the Rubber Service Laboratories at Akron, O., in November, 1927, and continued in this position until 1939, when he was placed in charge of the patent department at the company's plastics division at Springfield, Mass. In early 1942 he was called to active duty as an army colonel and later placed in charge of the government's patent department at Oak Ridge, Tenn. Since March, 1946, Mr. Evans has been in charge of the patent department at the Merrimac Division, Everett, Mass. He will be transferred to St. Louis.

Charles F. Booth has been appointed a senior research chemist at the central research department at Dayton, O., and will be engaged in inorganic chemical research. Mr. Booth, formerly a principal chemist in atomic energy research at

the Clinton Laboratories (Oak Ridge, Tenn.), was graduated from the University of Alabama in 1921 with a B.S. degree in chemical engineering. He received an M.S. degree from the same school in 1922 and the professional degree of chemical engineer in 1924. Then he was employed by Swann Chemical Co., Anniston, Ala., which later became a part of Monsanto. He was a research group leader at Anniston from 1930 until 1945, when he was transferred to the Clinton Laboratories.

**Bjorksten Research Laboratories**, 185 N. Wabash Ave., Chicago 1, Ill., has announced that Stuart O. Fiedler has accepted a position as manager of research of the Industrial Rayon Corp., Cleveland, O. Mr. Fiedler remains a director of Bjorksten Research Laboratories, but resigned as manager of the South Chicago branch. He joined the Bjorksten organization in 1945 and was the same year appointed manager of the South Chicago branch laboratory. In 1946 he was made a vice president. Previously he had been connected with the Burgess Laboratories, and with E. I. du Pont de Nemours & Co., Inc. Mr. Fiedler received his degree in chemical engineering from the University of Wisconsin.

Dr. Johan Bjorksten, president of the laboratories, has been elected a director of the Association of Consulting Chemists & Chemical Engineers, Inc., for a period of two years.

## NEW ENGLAND

### Brown Cabot Vice President

Godfrey L. Cabot, Inc., 77 Franklin St., Boston 10, Mass., has elected Owen J. Brown, Jr., a vice president, it was announced by Thomas D. Cabot, vice president and treasurer. Mr. Brown joined Cabot soon after receiving his B. S. degree in chemical engineering from Tufts College in 1935. For five years Mr. Brown did research at the company's laboratories in Boston and in its carbon black plants in the Southwest, particularly in the applications of carbon black in the rubber, paint, lacquer, printing ink, and plastics industries. Transferred to the company's technical sales and service staff, Mr. Brown became general sales manager when this department was reorganized and expanded in 1945.

The Cabot company recently completed an extended six-day meeting between sales and production heads and sales representatives at the company's southwestern headquarters in Pampa, Tex. The meeting was called to discuss new fine furnace carbon blacks, production schedules, the current carbon black shortage, and general production and sales policies. The Boston group attending the meeting included Mr. Brown, Vice President Russel G. Allen, Technical Director F. H. Amon, Assistant Sales Manager Donald Simonds, Manager of Special Blacks G. J. Duffy, and R. C. Mason, head of the shipping department. Sales representatives from London, England, to Los Angeles, Calif., gathered for the conference. Considerable time

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# STATEX-93

THE HMF WITH THE  
RIGHT STRUCTURE FOR  
TIRE COMPOUNDING

- UNDERTREADS
- SIDEWALLS
- INSIDE STOCKS



A COLUMBIAN COLLOID



COLUMBIAN CARBON CO. BINNEY & SMITH CO.

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DISTRIBUTOR

**MPC** (Medium Processing Channel)  
**STANDARD MICRONEX**

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**EPC** (Easy Processing Channel)  
**MICRONEX W-6**

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**VFF** (Very Fine Furnace)  
**STATEX-K**

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**FF** (Fine Furnace)  
**STATEX-B**

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**HMF** (High Modulus Furnace)  
**STATEX-93**

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**SRF** (Semi-Reinforcing Furnace)  
**FURNEX**

**COLUMBIAN CARBON CO.    BINNEY & SMITH CO.**

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was given over to detailed inspections of channel- and furnace-type carbon black plants in the Texas Panhandle. The group then visited Cabot plants in West Texas, after stopping off for a trip through the Carlsbad Caverns. The last two days of the conference were spent at Bar NI, the Cabot ranch which is located in Trinidad, Colo., where further discussion groups were held.

**Pittsburgh Plate Glass Co.**, Columbia Chemical Division, Pittsburgh 13, Pa., through Executive Sales Manager W. I. Galliher, has announced the appointment of William L. Platt as Boston district sales manager for the division. Mr. Platt joined the company's glass division in 1927 and three years later transferred to Columbia Chemical, where he specialized in industrial engineering and in various phases of the production of heavy chemicals. He is a graduate of Purdue University with a B.S. degree in chemical engineering. As district sales manager, Mr. Platt will maintain headquarters at the Little Bldg., Boston 16, Mass.

**Boston Woven Hose & Rubber Co.**, Cambridge, Mass., in its recent report to stockholders revealed that the new building for manufacturing purposes, started a year ago, has been completed, but not all the equipment has been received to put it into operation. New facilities for making V-belts, which will supplement the company's well-established business on flat transmission belting, are now nearing completion.

**General Electric Co.**, plastics division, Pittsfield, Mass., has appointed Addison E. Wiles, formerly assistant manufacturing manager of the division, manager of the Pittsfield molded products works, succeeding Arthur C. Treece, now assistant manager of the new G-E plastics laminating plant at Coshocton, O. Mr. Wiles came with General Electric as an engineer in the lamp department in 1939 and served successively as assistant general foreman at the electrical works of the lamp department, assistant manager of the Nottingham equipment works, industrial relations manager of the Cleveland equipment works, engineer in charge of the plastics division's engineering development laboratory, and assistant manufacturing manager of the plastics division.

Mr. Treece joined the company in 1922 at the Fort Wayne, Ind. apparatus works. He was engineer of the Fort Wayne plastics plant, district sales manager of the Chicago office of the plastics department, engineer of plastics molding plant, and manager of the Pittsfield molded products works.

**Plymouth Rubber Co., Inc.**, Canton, Mass., recently announced the election of Joseph C. Mirguet as a vice president and Edward B. Conway as a director. Mr. Mirguet was formerly vice president of Hickok Mfg. Co.; while Mr. Conway is a vice president of F. Eberstadt & Co., Inc.

**Hobbs Mfg. Co.**, Worcester, Mass., through President W. H. Ware, has announced the establishment of an experimental testing laboratory in connection with the company's new Tri-Power die cutting press. According to Mr. Ware,

the laboratory has been set up to enable manufacturers to test the efficiency of the new press for their particular die cutting problems. The complete test together with a detailed report on results is made for the manufacturer without any cost or obligation on his part. Companies engaged in the manufacture of rubber products, plastics, wearing apparel, gaskets, paper products, or any other product involving die cutting, or where die cutting might be used efficiently are invited to send in sample dies and materials for a thorough testing on the new press. The manufacturer, if he so desires, may send a representative to watch these tests. All inquiries or shipments should be addressed to the Experimental Test Station, Hobbs Mfg. Co., 26 Salisbury St., Worcester 5, Mass.

## CANADA

### Further Expansion at Stokes

Lloyd R. Leaver, president and managing director of Joseph Stokes Rubber Co., Ltd., Welland, Ont., on October 3 announced that a contract has been placed for the construction of another addition to the Stokes plant. The new addition will contain approximately 15,000 square feet of floor space and will be of the most modern steel, brick, and concrete fireproof construction. It will be approximately 235 feet long by 60 feet wide and when completed, will contain up-to-date men's and women's change and rest rooms, a modern first-aid and medical center and will provide additional space to house the company's engineering, time study and production offices, personnel offices, and a new development laboratory. The estimated cost of this new addition when completed is around \$150,000.

This addition, Mr. Leaver stated, is being undertaken mainly to provide more modern and better working conditions for Stokes employees and to enable the company more efficiently to handle the greatly increased volume of business which has marked the company's forward progress during the past few years.

### Record Sales for Goodyear

Overall sales of Goodyear Tire & Rubber Co. of Canada, Ltd., Toronto, Ont., are running at a record level and will be considerably above the volume for 1946. With the capacity of the plants at New Toronto and Bowmanville, Ont., substantially increased during the war years, this high rate of operations is continuing, and a satisfactory backlog of orders is being maintained. The demand for replacement tires is catching up; while the demand for new tires depends on the number of motor vehicles being manufactured. Tractor and heavy-duty-type tire business is good, but the export division is somewhat below last year's level because of exchange difficulties.

Prevailing building conditions and slow deliveries of equipment are holding up the company's program of expansion. The new plant at Quebec City, which will be used for the manufacture of miscellaneous

rubber products, will not be ready for some months. The two new factories at New Toronto for the production of Air-foam and Pliofilm will be completed early next year.

The recent declaration of an extra dividend of \$3 per share, payable October 1, indicates that a sum of at least \$7 per share will be paid by Goodyear of Canada in 1947, a total exceeded by one year in the company's history. 1938, when \$7.50 per share was paid. Operations last year were seriously affected by a four months' strike, and net profits for the year 1946 were equal to \$5.40 per common share.

Goodyear of Canada, received top honors in its field for its direct mail campaign in the "Best of Industry" competition at the recent thirtieth annual Direct Mail Advertising Association convention at the Carter Hotel, Cleveland, O.

**Polymer Corp.**, Sarnia, Ont., will manufacture chemical raw materials for industries dependent on it "regardless of its future in manufacturing synthetic rubber," Canadian Reconstruction Minister C. D. Howe announced recently. The statement was part of a message read by Deputy Minister V. W. Scully to officials and employees celebrating Polymer's fifth birthday and was believed to be a reply to rumors that falling prices for rubber might cause a curtailment of Polymer production. The statement further read that provided costs of production can be held at present levels, Minister Howe believes that Polymer will have a permanent place in the rubber market.

Simultaneously, Polymer released figures on its production to date of GR-S and Butyl. The company produced 56,056,679 pounds of GR-S in 1944, 82,227,592 pounds in 1945, 80,279,070 pounds in 1946 and 88,776,891 pounds to date in 1947. Butyl production totaled 1,232,980 pounds in 1944, 18,947,005 pounds in 1945, 25,148,382 pounds in 1946, and 19,040,205 pounds to date in 1947.

**Dominion Rubber Co., Ltd.**, Montreal, P. Q., has appointed Harold F. Meech assistant to the manager, footwear sales, according to C. B. Parsons, manager, footwear sales. Mr. Meech was born in Westboro, Ont., 34 years ago. He was educated in Toronto, attended the University of Toronto prior to joining Dominion Rubber in 1935, where he has worked in various capacities in the footwear division. He also served with the Stormont, Dundas and Glengarry Highlanders, Third Canadian Infantry Division, in the late war.

Wilson A. Martin has been appointed manager of industrial relations and industrial engineering at the textile division plant of Dominion Rubber, at Kitchener, according to M. H. Hudspeth, general manager of the company's textile division. Mr. Martin previously had been a member of the industrial engineering staff of the company's Dominion tire factory in Kitchener. On entering the company in January, 1946, on return from war service he was assigned to the central industrial engineering department at the company's head office in Montreal.

Born in Toronto, Mr. Martin attended the Kitchener-Waterloo Collegiate before entering the University of Toronto where he studied economics. He was formerly an employee of the Waterloo Trust & Savings Co. and served in the Canadian Army for five years.

## OBITUARY

### Henry G. Tyer

**T**HE vice president and former president of Tyer Rubber Co., Andover, Mass., Henry George Tyer, died suddenly on September 26 as the result of a heart attack. The 62-year-old executive was serving his fortieth year with the company when he was stricken while vacationing in northern Maine.

A native of Andover, where he was born on February 5, 1885, Mr. Tyer was a graduate of Phillips-Andover Academy and Harvard University, graduating from the latter in 1907. In that same year, after completing school, he entered the employ of the Tyer Rubber Co., the firm founded by his grandfather. He began work in the factory and was later transferred to the sales and export departments. Soon after joining the company he was made a director and in 1917 he was elected to the presidency. After one year as president he left to enter the Artillery Officer's Training School. He returned to the company upon completion of his Army service and in 1931 was elected a vice president. At the time of his death he was also assistant sales manager of the company's sundries division.

A former member of the Rubber Association of America, he was long active in Andover's civic affairs, having been a member of the Andover Historical Society, a vice president and trustee of the Andover Home for Aged People, a trustee of the Andover Guild and of the Memorial Hall Library in Andover, a director of Andover Press, Ltd., an incorporator of the Andover Savings Bank, chairman of the town's first playground committee, a trustee of the Punchard Free School, a member of the tire panel, a member of the wartime rationing board, and for many years a clerk of Christ Episcopal Church. He also belonged to the Harvard Club of Boston.

Funeral services were held at Christ Episcopal Church, Andover, and burial was in Andover on September 30.

Surviving Mr. Tyer are his widow, two daughters, and two sisters.

### Vernon E. Royle

**V**ERNON E. ROYLE, former president and director of John Royle & Sons, Paterson, N. J., died September 19 as the result of a heart attack. The 70-year-old grandson of John Royle, founder of the company, and son of Vernon Royle, former president, retired in 1940 because of serious illness.

Born in Paterson on July 10, 1877, Mr. Royle attended elementary and high school there. Upon graduation in 1895 he entered the employ of John Royle & Sons and spent the next two years acquiring experience in the shop. By the time he left to enter Stevens Institute of Technology he was an accomplished machinist. In 1902 he completed his studies at Stevens, returned to the company, and became closely associated with his father in the business, taking active charge of engineering and drafting. He became president after his father's death in 1934.

The deceased, a founder of the Paterson Vocational School, held many machine patents. Mr. Royle, during his lifetime, was a member of the American Society



J. G. Gessford

### Vernon E. Royle

of Mechanical Engineers, the American Society for Testing Materials, the American Society for Steel Treating, the Alumni Association of Stevens Institute of Technology, and the board of directors of the Paterson Savings Institution. He also belonged to Ivanhoe Lodge # 88 F & A M and the Melita Commandery, Knight Templars and Shriners, the Paterson Rotary Club, and North Jersey Country Club.

Funeral services were on September 23 from his late home followed by burial.

He is survived by his widow and several nieces and nephews.

### A. E. Rearick

**A**RCH E. REARICK, 53, associated with Goodyear Tire & Rubber Co., for 38 years, died October 22 in Gadsden, Ala. He had resided in Gadsden since 1936, and his latest post was general foreman of the reclaim division at the Goodyear plant. He was buried in Rose Hill Cemetery, Akron, on October 26.

Born in Strasburg, O., Mr. Rearick joined Goodyear in Akron when he was 15. He became general foreman of stock preparation at Goodyear Plant 2 in Akron, and in 1930 he was sent to the company's factory in Sydney, Australia, as a division superintendent. He returned to this country in 1936 as a division superintendent of the Gadsden plant.

A Mason and a Shriner, Mr. Rearick was past commander of the Akron commandery, Knights Templar.

The deceased is survived by his wife four brothers, and one sister.

### Ernest H. Blaker

**E**RNEST H. BLAKER, former research scientist for The B. F. Goodrich Co., Akron, O., died suddenly in Akron on October 20. Widely known for his rubber research dealing with heat and temperature control and author of several technical papers, he spent 20 of his 77 years in the employ of Goodrich. Though officially retired in 1939, he returned to continue research during the war.

Born in Newton Pa., he received his

doctor's degree in physics from Cornell University, where he remained, serving on the faculty, until 1919 when he joined Goodrich. Prior to that Dr. Blaker had been graduated from the University of Kansas with a degree in civil engineering. While still on the faculty at Cornell, he instructed pilots in meteorology during the first World War.

Dr. Blaker was a member of the American Chemical Society, American Physical Society, American Association for the Advancement of Science, Automotive Engineering Society, the Masonic Order, Sigma Xi, and Beta Theta Pi.

Funeral services were held at the Billow Chapel, Akron, on October 22.

Dr. Blaker is survived by his wife and two grandchildren.

### E. M. Winegar

**E**DMUND MILLS WINEGAR, director of engineering at The Ohio Rubber Co., Willoughby, O., was killed in an automobile accident on October 18.

Born in Middlebury, Ind., on April 12, 1899, he attended school in Goshen, Ind.

Mr. Winegar came to Willoughby in April, 1924, to work for the Buckeye Rubber Co., which became The Ohio Rubber Co. in 1926. Starting off as a master mechanic, he attained the position of director of engineering for Ohio Rubber. He had been a member of the Willoughby Council since 1937, where he served as chairman of the safety committee and as a member of both the welfare and finance committees.

Mr. Winegar was a member of Willoughby Lodge No. 302, Free & Accepted Mason, Al Koran Temple of Cleveland, Koran Club of Cleveland, Scottish Rite, 32nd Degree Mason, a charter member of the Fraternal Order of Eagles, No. 2300, a member of the Society of Automotive Engineers, The National Association of Foreman, Army Ordnance Association, Cleveland Engineering Society, the American Chemical Society, and the Old Timers Club at Ohio Rubber.

The deceased is survived by the widow, a son, and a daughter.

Burial services were held October 22 at the Methodist Church in Willoughby.

### Clifford W. Smith

**C**LIFFORD W. SMITH, assistant factory personnel manager for the Goodyear Tire & Rubber Co., Akron, O., died on October 17 in Akron after a two-week illness of bulbar poliomyelitis.

Mr. Smith was born in Blanket, Tex., on April 15, 1915. He was graduated from Pomona College, Calif. In 1936 he joined Goodyear, starting on the production training squadron at the Los Angeles plant. Rising to the position of employment manager, he was transferred in 1941 to the Arizona division of Goodyear Aircraft Corp. in a similar capacity. A year later he was transferred, this time to Akron, where he was again employment manager. In 1943 he was made personnel manager of the synthetic rubber division and in August 1945, assistant factory personnel manager, after having served as assistant to the director of personnel.

Burial was in California.

Surviving Mr. Smith are his wife, two children, his parents, two brothers, and two sisters.

# John H. Coulahan

**F**UNERAL services were held September 15, in Concord, N. H., for John H. Coulahan. Interment was in Pembroke Hill Cemetery, Pembroke, N. H.

The deceased was born in Boston, Mass., August 17, 1876, and received his education in the local public schools and Harvard College.

Mr. Coulahan spent many years as an executive in the rubber manufacturing industry. From 1909 to 1912 he served as production manager in the Boston Woven Hose & Rubber Co., Cambridge, Mass. In the Spring of 1912 he joined the Mechanical Rubber Co., Cleveland, O., a unit of United States Rubber Co., where he functioned in the dual capacity of production manager and executive assistant to the factory manager. At the end of World War I he was transferred to the footwear division of U. S. Rubber Co. at New Haven, Conn., serving in a capacity similar to that at Mechanical Rubber Co. In 1923 he entered the employ of the Stedman Rubber Flooring Co., South Braintree, Mass., as purchasing agent. He remained with that company until his retirement in 1933.

He leaves his wife, a daughter, a son, and eight grandchildren.

# Dividends Declared

COMPANY	STOCK	RATE	PAYABLE	STOCK OF RECORD
Baldwin Rubber Co. ....	Com.	\$0.17 1/2	Oct. 25	Oct. 15
Belden Mfg. Co. ....	Com.	0.30 extra	Jan. 2	Nov. 17
Collyer Insulated Wire Co. ....	Com.	0.30 q.	Nov. 1	Oct. 23
Crown Cork & Seal Co., Ltd. ....	Com.	0.50 q.	Nov. 15	Oct. 15
Dayton Rubber Mfg. Co. ....	Com.	0.30 q.	Oct. 25	Oct. 10
Dayton Rubber Mfg. Co. ....	Pfd. "A"	0.50 q.	Oct. 25	Oct. 10
Detroit Gasket & Mfg. Co. ....	Com.	0.12 1/2	Oct. 25	Oct. 10
Dunlop Tire & Rubber Corp. ....	Pfd.	0.62 1/2 s.	Dec. 31	Dec. 15
Dunlop Tire & Rubber Goods Co., Ltd. ....	5% Cum. 1st Pfd.	2 1/2%	Dec. 31	Dec. 15
Firestone Tire & Rubber Co. ....	Pfd.	1.12 1/2 q.	Dec. 1	Nov. 15
General Tire & Rubber Co. ....	Com.	0.25 q.	Nov. 28	Nov. 18
Hewitt-Robins, Inc. ....	Com.	0.25 q.	Dec. 15	Nov. 28
Johnson & Johnson ....	Pfd.	1.00 q.	Nov. 1	Oct. 17
Lee Rubber & Tire Corp. ....	Com.	1.00 extra	Oct. 28	Oct. 15
Lee Rubber & Tire Corp. ....	Com.	5% stock	Oct. 28	Oct. 15
Lee Rubber & Tire Corp. ....	Com.	0.50 q.	Oct. 28	Oct. 15
Link Belt Co. ....	Com.	0.75 q.	Dec. 1	Nov. 1
Midwest Rubber Reclaiming Co. ....	Com.	0.25 q.	Oct. 30	Oct. 20
Okonite Co. ....	Com.	1.00 q.	Nov. 1	Oct. 15
Plymouth Rubber Co., Inc. ....	Com.	0.25 q.	Oct. 15	Oct. 2
Swan Rubber Co. ....	Pfd.	\$1.20 q.	Nov. 1	Oct. 22
Thermoid Co. ....	Pfd.	0.62 1/2 q.	Nov. 1	Oct. 20

**Boston Woven Hose & Rubber Co.**, Cambridge, Mass. Year ended August 31, 1947: net income, \$1,312,848, equal to \$14.74 a common share against \$498.671, or \$5.28 a share, for the previous fiscal year; net sales, \$15,671,957, against \$10,393,760; taxes, \$1,000,007, against \$590,289; current assets, \$7,107,268, current liabilities, \$1,729,362, against \$6,079,473 and \$1,073,126, respectively, on August 31, 1946.

**Brunswick-Balke-Collender Co.**, Chicago, Ill., and subsidiaries. Nine months to September 30: net profit, \$1,067,881, equal to \$2.15 a common share, contrasted with \$897,907, or \$1.73 a share in 1946; net sales, \$20,985,989, against \$14,917,532.

**Eagle-Picher Co.**, Cincinnati, O., and consolidated subsidiaries. Nine months to August 31, 1947: net profit, \$3,133,730, equal to \$3.52 a common share, against \$1,113,602, or \$1.25 a common share, for the 1946 months.

**General Cable Corp.**, New York, N. Y. Nine months ended September 30: net income, \$4,627,400, against \$1,133,719 in the 1946 period.

**Seiberling Rubber Co.**, Akron, O. Third quarter 1947: net earnings, \$170,020, against \$371,809 in the '46 period; net sales, \$7,685,286, against \$8,369,996.

**Flintkote Co.**, New York, N. Y., and subsidiaries. Forty weeks to October 4: net income, \$6,102,511, equal to \$4.91 each on 1,183,921 common shares, compared with \$2,625,738, or \$1.98 a share, last year; net sales, \$55,191,448, against \$38,721,624.

**National Automotive Fibres, Inc.**, Trenton, N. J., and wholly owned subsidiaries. First nine months, 1947: net profit, \$1,451,914, equal to \$1.52 a share, against \$851,559, or 89¢ a share, in the 1946 period.

**Phillips Petroleum Co.**, Bartlesville, Okla., and subsidiaries. First nine months, 1947: net profit, \$25,706,156.62, or \$5.20 each on 4,939,890 outstanding shares, compared with \$14,763,153.29, or \$3 each on 4,916,987 outstanding shares, for the same period, 1946; provision for federal income taxes, \$9,831,100 against \$5,161,000.

**Union Carbide & Carbon Corp.**, New York, N. Y., and subsidiaries. First nine months, 1947: net income, \$54,865,182, equal to \$5.78 each on 9,479,788 outstanding shares, contrasted with \$40,331,672, or \$4.30 each on 9,366,488 outstanding shares, for same period in 1946.

# FINANCIAL

**Baldwin Locomotive Works**, Philadelphia, Pa., and wholly owned subsidiaries. Nine months ended September 30: net profit, \$1,238,918, equal to 60¢ each on 1,871,553 common shares; sales, \$67,966,752; provision for income taxes, \$795,000.

**British Rubber Co. of Canada, Ltd.**, Montreal, P. Q. Quarter ended July 30, 1947: consolidated earnings, \$259,045, equal to \$34.54 a share; reserve for depreciation, \$24,470; provision for taxes, \$247,455.

**Dow Chemical Co.**, Midland, Mich., and subsidiaries. Quarter to August 31: net profit, \$4,396,398, equal to 79¢ a common share, compared with \$3,607,303, or 66¢ a share, for the August quarter a year ago.

# United States Rubber Statistics, July, 1947

(All Figures in Long Tons, Dry Weight)

	New Supply			Distribution		Stocks, End of Month
	Production	Imports	Total	Consumption	Exports	
Natural Rubber, Total .....	0	55,771	55,771	39,448	421	124,705
Natural Latex, Total .....	0	1,472	1,472	941	0	6,919
Natural Rubber and Natural Latex: Total .....	0	57,243	57,243	40,389	421	131,624
Synthetic Rubber, Total .....	30,898*	0	31,917	37,607	412	97,728
GR-S .....	25,901*	0	25,978	30,682	114	69,128
Butyl .....	777*	0	3,490*	4,182	2	18,014
Neoprene .....	3,490*	0	1,942	2,459	165	7,318
Nitrile types .....	1,507*	0	507	284	131	3,268
Natural Rubber and Latex, and Synthetic Rubber: Total .....	435†	57,243	89,160	77,996	833	229,352
Reclaimed Rubber .....	507†	0	21,252	20,433	1,052	39,704
Grand Totals .....	53,169	57,243	110,412	98,429	1,885	269,056

\*Government plant production.

†Private plant production.

‡Includes stocks shipped for export, but not cleared.

Source: Office of Materials Distribution, United States Department of Commerce.

# New Incorporations

**Peerless Rubber Corp.**, Los Angeles, Calif. \$75,000 capital. Directors, R. H. and R. W. Pratt and L. C. Viereck, all of Los Angeles

**S. & G. Rubber Co.**, Los Angeles, Calif. \$25,000 capital. Directors, K. Simon, J. Galitza, and T. G. Cherry, all of Los Angeles.

**Scomar Products, Inc.**, Los Angeles, Calif. \$25,000 capital. Directors, R. and R. Scope and N. Marks, all of Los Angeles. To manufacture, sell, and distribute rubberized and abrasive products.

**Smith's Rubber Products Co., Inc.**, Long Beach, Calif. \$100,000 capital. Directors, E. B. Smith, Wilmington, Calif., and A. Rayes and M. E. Lewis, Jr., both of Long Beach.

# Patents and Trade Marks

## APPLICATION

### United States

2,426,627. **Wheel Cover Having an Outer Section of Resiliently Pliable Plastic Material.** G. A. Lyon, Allentown, N. J.  
2,426,666. **In a Shoe, a Welt of Plastic Material and an Outsole Having Pegs of Plastic Material Compatible with That of the Welt.** J. J. Brophy, Salem, Mass., assignor to United Shoe Machinery Corp., Flemington, N. J.  
2,426,726. **Life-Preserving Bathing Suit.** J. M. Combs, Cleveland, O.  
2,426,735. **Foot Balancing Pad for Insertion in a Shoe, Including a Unitary Sheet of Resilient Material Having Portions thereof of Different Densities.** J. M. Hiss, Los Angeles, Calif.  
2,426,769. **Plastic Piping.** C. Gould, New York, N. Y.  
2,426,798. **In a Cylindrical Ammunition Container, a Partition Including a Metal Ring Having a Rubber Casing Molded Over It.** J. P. Stein, Los Angeles, Calif.  
2,426,820. **Laminated Structure Including a Layer of Cyclized Rubber to Which is Attached a Layer of Polyisobutylene Mixed with Carbon Black and Paraffin Wax.** H. C. Evans, Cranford, and D. W. Young, Roselle, both in N. J., assignors, by mesne assignments, to Jasco, Inc., a corporation of La.  
2,426,858. **Insulated Conductor Having Layers of Fabric Impregnated with Ester Gum Saturants Surrounding the Insulation.** S. E. Brillhart, Lutherville, and A. N. Gray, Joppa, both in Md., assignors to Western Electric Co., Inc., New York, N. Y.  
2,426,927. **Nursing Unit.** H. H. Ganson, assignor to Hygeia Nursing Bottle Co., Inc., both of Buffalo, N. Y.  
2,427,229. **In an Article of Footwear, an Upper of Sheet-Like Elements of Synthetic Plastic Material, Vulcanized Rubber, and Another Material; These Elements Are United through Apertures in the Synthetic Plastic Element.** C. A. Ripley, Melrose, Mass., assignor to B. F. Goodrich Co., New York, N. Y.  
2,427,251. **In an Athlete's Training Sandal with a Metal Base, a Heel Standard with a Pair of Openings and a Toe Standard with an Opening, a Cushion Plate Having a Rubber Covering and Tabs at Its Ends Adapted to be Positioned in the Openings in the Heel Standard and the Toe Standard.** L. L. Ray, Sheboygan, Wis.  
2,427,262. **Inflatable Solar Distillation Apparatus.** W. R. P. Delano, Syosset, N. Y., assignor to Galloway Chemical Corp., a corporation of N. Y.  
2,427,502. **Heated Wiper for Windshields.** L. Marick, Grosse Pointe Farms, Mich., assignor to United States Rubber Co., New York, N. Y.  
2,427,516. **Inflated Truss Pad Including a Ring-Like Rim of Rubber Adapted to Fit against the Wearer's Flesh, and a Pair of Flexible Airtight Diaphragms Interspersed with the Ring.** C. W. Brooks, Oklahoma City, Okla.  
2,427,636. **Valve Packing Composition Including Strands of Non-Combustible Fibrous Material Impregnated with a Paste of an Inorganic Pulverulent Lubricant and an Organic Siloxane.** W. E. Vaughan, Berkeley, and H. C. Kennedy, Oakland, assignors to Shell Development Co., San Francisco, all in Calif.  
2,427,664. **Hearing Guard and Ear Protector Including a Resilient Plug and a Deformable Resilient Circumferential Flange on One Side of the Plug.** J. Y. Dunbar and J. S. Knight, United States Navy.  
2,427,787. **Piston Seal.** F. B. Hunter, La Canada, Calif., assignor to Adel Precision Products Corp., a corporation of Calif.  
2,427,883. **Tube Clamp Including a Loop of Relatively Soft Pliable Plastic Material Having a Pair of Separate Flat Tab Ends of Harder Material.** L. H. Score and J. C. Haupp Jr., both of North Hollywood, Calif., assignors, by mesne assignments, to Bendix Aviation Corp., South Bend, Ind.  
2,427,906. **Pantries of Plastic Sheet Material.** W. J. Golightly and F. A. Gardina, assignors of one-third to E. O. Spotts, Jr., all of Tarentum, Pa.  
2,427,951. **Walking Heel.** J. J. Ettlinger, assignor to Zimmer Mfg. Co., both of Warsaw, Ind.  
2,427,986. **Corrective Insole Made up of a Relatively Thin Top Layer of Smooth-Finished Material, a Thicker Bottom Layer of Resilient Material, and a Supporting Element Including a Portion of a Relatively Rigid Material and a Cushioning Portion of Sponge Rubber of Substantially the Same Thickness**

as the Relatively Rigid Material. H. L. Whitman, East Bridgewater, Mass., assignor to B. F. Goodrich Co., New York, N. Y.

### Dominion of Canada

443,817. **Egg Stamping Device Including a Stamp Mounted on a Rubber Pad.** M. A. Weightman, Chilliwack, B. C.  
443,917. **In a Vibration Absorbing Mount, Cylindrical Cushions of Spongy Elastic Material.** C. S. Robinson, Teterboro, N. J., U. S. A.  
443,988. **Windshield Cleaner.** Trico Products Corp., Buffalo, assignee of W. C. Hess, Kenmore, both in N. Y., U. S. A.  
444,028. **Hammer Head Having a Molded Plastic Body Portion.** W. K. Jahn, Los Angeles, Calif., U. S. A.  
444,089. **Contour-Conforming Knitted Fabric Including a Preponderance of Courses of Knitted Loops of Relatively Elastic Thread.** Sure-Fit Products Co., Bethlehem, assignee of J. A. Krasnov, Melrose Park, and M. M. Kulper, Allentown, all in Pa., U. S. A.  
444,114. **Insulator Including a Molded Body of Committuted Wood and Synthetic Resin.** J. A. Daly, Toronto, Ont.  
444,124. **In a Screen Process Printing Machine, a Squeegee Including a Support, an Inclined Plate and a Paint Trough, and Between Trough and Plate, a Strip of Rubber Having Its Free Edge beyond the Trough Edge.** Fastening Elements securing the Trough and the Rubber Strip to the Plate. N. Louft, Silver Springs, Md., U. S. A.  
444,128. **In a Hydraulic Accumulator Including a Container, an Elastic Diaphragm to Form Two Variable Volume Chambers Inside the Container.** J. Mercier, New York, N. Y., U. S. A.  
444,147. **Accumulator Bladder of Flexible Material Having Transverse Annular Thickened Sections to Centralize the Bladder, as It Collapses, to Prevent Rubbing of the Material.** Bendix Aviation Corp., South Bend, Ind., assignee of T. B. Linton, North Hollywood, Calif., U. S. A.  
444,179. **V-Belt Transmission.** Massey-Harris Co., Ltd., assignee of T. Carroll, both of Toronto, Ont.

### United Kingdom

591,639. **Boot and Shoe Protectors.** Eccles & Co. (Rubber), Ltd., and J. Eccles.  
591,689. **Belt or Like Conveyers.** Bennis Combustion, Ltd., and A. W. Bennis.  
591,192. **Rigid Molded Articles with Great Tensile Strength.** Compagnie Generale d'Electricite.  
591,146. **Flexible Couplings.** Dunlop Rubber Co., Ltd., and T. E. H. Gray.  
591,367. **Flexible Tubing.** Compoflex Co., Ltd., and J. C. Wemyss-McAlcott.  
591,372. **Adhesive sheets.** Johnson & Johnson (Great Britain), Ltd.  
591,374. **Means for Protecting Surfaces from Ice Formation.** Dunlop Rubber Co., Ltd., J. Anderson, and E. F. Field.  
591,531. **Respirator Masks, Especially Oxygen Masks or Aircrews.** J. C. Gilson.  
591,560. **Flexible Tubing, Conduits, Etc.** Balf's Asbestos & Engineering, Ltd., and J. E. Heald.  
591,447. **Electric Cables.** Standard Telephones & Cables, Ltd., and A. A. New.  
591,698. **Oil Sealing Rings.** W. T. Coggins.  
591,885. **Coated Fabrics for Use as Leather Substitutes.** Salpa Francaise.

## PROCESS

### United States

2,426,609. **Making a Condenser Dielectric, Including Coating a Thixotropic Suspension of an Alkali Earth Titanate in Alcohol on a Film of Polystyrene, Drying the Coating Partially, Calendaring, and Then Drying.** F. B. Hodgdon, Naperville, Ill., assignor to Western Electric Co., Inc., New York, N. Y.  
2,426,775. **Curing Sheeted Plastic Material.** E. A. Lang, Newburgh, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.  
2,427,183. **Electrical Insulation Made by Applying Polytetrafluoroethylene in Solid**

Form between Layers of Siliceous Material and Producing a Unitary Laminated Structure by Applying Heat and Pressure. K. L. Berry, Hockessin, assignor to E. I. du Pont de Nemours & Co., Inc., both in Wilmington, Del.

2,427,305. **Making Diaphragms from a Liquid Plastic of a Synthetic Organic Polymer.** F. V. Sander, Highland Park, and C. H. Cotes, North Plainfield, both in N. J., assignors to Ortho Pharmaceutical Corp., a corporation of N. J.  
2,427,334. **Covered Elastic Thread.** S. W. Alderfer, Akron, O.  
2,427,507. **Filling the Interstices of a Flexible Electrical Cable Containing Stranded Wires Insulated with Plasticized Vinyl Chloride Resins.** G. M. Powell, 3rd, South Charleston, W. Va., and J. E. Brister, Summit, N. J., assignors to Carbide & Carbon Chemicals Corp., a corporation of N. Y.  
2,427,836. **Microporous Rubber Polychrome Printing Plates.** R. G. Chollar and G. J. Wilson, assignors to National Cash Register Co., all of Dayton, O.

### Dominion of Canada

444,203. **Coated Abrasive Article.** Minnesota Mining & Mfg. Co., assignee of W. J. McNamara and J. H. Kugler, all of St. Paul, Minn., U. S. A.

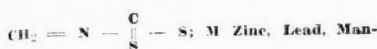
### United Kingdom

591,617. **Collapsible Tubes.** Soc. of Chemical Industry in Basle.  
591,184. **Fibrous Sheet Material.** Latex Fiber Industries, Inc.  
591,493. **Flexible Material Including a Plasticized Thermoplastic Substance and Fibers.** Dunlop Rubber Co., Ltd., and F. H. Lane.  
591,457. **Thermally Plasticizing Thermoplastic Materials.** H. C. Young.  
591,590. **Insulation of Electric Wire and Cable by Extrusion.** Standard Telephones & Cables Ltd., and J. M. Keenan.

## CHEMICAL

### United States

2,426,586. **Mixed Organometallic Salt Produced by Reacting in Acidic Aqueous Medium of a Water-Soluble Salt of a Metal of Valence Greater Than One with an Alkali Metal Salt of N-Methylene Dithiocarbamic Acid and with an Alkali Metal Salt of an Organic Sulfhydryl Compound.** J. J. Beber, Copley, O., assignor to B. F. Goodrich Co., New York, N. Y.  
2,426,647-648. **Organic Sulfur Compounds Formed by the Catalytic Addition of a Compound from the Group of Hydrogen Sulfide and Mercaptans to an Olefin.** Q. A. Schulze and W. W. Crouch, Bartlesville, Okla., assignors to Phillips Petroleum Co., a corporation of Del.  
2,426,705. **Improved Process for the Separation of Isoprene of High Purity from a Hydrocarbon Fraction Rich in Various C Hydrocarbons.** J. A. Patterson, Westfield, and H. W. Scheeline, Elizabeth, both in N. J., assignors to Standard Oil Development Co., a corporation of Del.  
2,426,706. **Segregation of Olefinic Hydrocarbons by Extractive Distillation.** J. A. Patterson, Westfield, N. J., assignor to Standard Oil Development Co., a corporation of Del.  
2,426,725. **Esters of Endothylene-Substituted Cyclopentanols.** H. A. Bruson, assignor to Resinous Products & Chemical Co., both of Philadelphia, Pa.  
2,426,728. **Cold Drawn Molecularly Oriented Copolymers of Acrylonitrile, an Ethylene Alpha Beta Dicarboxylic Acid Diester of a Saturated Monohydric Alcohol and Acrylic Esters or Vinyl Esters.** G. F. D'Alleio, assignor to Pro-phy-lacetic Brush Co., both of Northampton, Mass.  
2,426,821. **Separating a Mixture of Isoprene and Monoolens by Azotropic Distillation in the Presence of Methyl Formate.** T. W. Evans, Oakland, R. C. Morris, Berkeley, and E. C. Shokal, Oakland, assignors to Shell Development Co., San Francisco, all in Calif.  
2,426,854. **Polymerization of Chloroprene in an Aqueous Emulsion in the Presence of a Water Soluble Salt of an Acid Peroxide and a Compound of the Class of Sulfonic Acids of Anthraquinone and Their Water Soluble Salts.** P. O. Bare, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.  
2,426,855. **Vulcanization Accelerator consisting of a Mixed Organometallic Salt of the Formula A-M-B. Where A Is the Radical**



ganese, Iron, or Copper; and B is a Radical Derived by Removing Hydrogen from the -SH Group of Sulfhydryl Compounds. A. J. Beber, Copley, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,426,913. Polymeric Alkyl-Type Compounds and Derivatives thereof. D. E. Adelson and H. F. Gray, Jr., both of Berkeley, assignors to Shell Development Co., San Francisco, both in Calif.

2,426,916. Producing Polysulfide Rubber of Low Water Permeability with the Aid of a Preformed Basic Water Soluble Ionizable Phosphate. N. F. Barr and W. K. Schneider, assignors to Stoner-Mudge, Inc., all of Pittsburgh, Pa.

2,426,917. Producing Polysulfide Rubber of Low Water Permeability with the Aid of a Preformed Water Soluble Ionizable Ammonium Compound. N. F. Barr and W. K. Schneider, assignors to Stoner-Mudge, Inc., all of Pittsburgh, Pa.

2,426,994. Sulfur-cured Dihydroxyalkane-Dicarboxyalkane-Dicarboxyalkane Polyester. C. J. Froesch, Summit, N. J., assignor to Bell Telephone Laboratories, Inc., New York, N. Y.

2,427,063. Butadiene-Styrene Copolymer Plasticized with a Metallic Drier and a Ketone or Aldehyde. C. J. Mighton and H. E. Schroeder, assignors to E. I. du Pont de Nemours & Co., Inc., all of Wilmington, Del.

2,427,070. Vulcanizing Vinyl Resin by the Incorporation of the Reaction Product of Anomalia with an Aliphatic Saturated Aldehyde Having Less than 5 Carbon Atoms and Heating at 300 to 350° F. L. F. Reuter, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,427,071. Vulcanizing Vinyl Resins by Incorporating a Condensation Product of Butyraldehyde and Aniline and an Organic Compound. L. F. Reuter, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,427,077. Composition Including a Mixture of Finely Divided Dry Solid Chlorinated Polysilobutylene and Pulverized Petroleum Coke Containing a Small Amount of Hydrogen. A. L. Tarr, Boulder City, Nev., and G. W. Oxley, Elizabeth, N. J., assignors to Standard Oil Development Co., a corporation of Del.

2,427,126. Manufacture of Shaped Articles by Saponification of Artificial Threads, Foils, Etc., Having as Basis of a Polyvinyl Compound, administrator of the estate of H. Dreyfus, deceased.

2,427,192. Synthetic Rubber Including a Blend of Butadiene-Styrene Copolymer and a Curable Chloroprene Polymer. J. F. Brovsky, assignor to Gates Rubber Co., both of Denver, Colo.

2,427,196-197. Bonding Rubber or Synthetic Rubber Compound to Metallic Surfaces with the Aid of a Thin Film Whose Sole Active Ingredient is an Ester of the Group of Dibutyl Phthalate, Tricresyl Phosphate, Amyl Acetate, Ethyl Acetate, Butyl Acetate, Ethyl Acetoacetate, Methyl Benzoate, Methyl Salicylate, Triethylene-Glycol-Di-2-Ethyl Butyrate, and Triethylene-Glycol-Di-2-Ethyl Hexoate. T. K. Cox, Randallstown, Md., assignor to Western Electric Co., Inc., New York, N. Y.

2,427,198. Rubber Compound Layers Bonded Together by a Film Whose Sole Active Ingredient is an Ester of the Group of Dibutyl Phthalate, Tricresyl Phosphate, Ethyl Acetate, Butyl Acetate, Ethyl Acetoacetate, Methyl Benzoate, Triethylene-Glycol-Di-2-Ethyl Butyrate and Triethylene-Glycol-Di-2-Ethyl Hexoate. W. P. Prisco, Dundalk, Md., assignor to Western Electric Co., Inc., New York, N. Y.

2,427,303. Preparing a Solid Elastic Copolymer by Reacting together Isobutylene and Butadiene in the Presence of a Metal Halide Catalyst of the Friedel-Crafts Type Associated with an Alkali Metal. J. A. Reid, Bartlesville, Okla., assignor to Phillips Petroleum Co., a corporation of Del.

2,427,309. High Boiling Mercaptans. W. A. Schulze, Bartlesville, Okla., assignor to Phillips Petroleum Co., a corporation of Del.

2,427,337. A Monovinylfluorene. R. K. Abbott, Jr., and E. A. Kern, both of Pittsfield, Mass., assignors to General Electric Co., a corporation of N. Y.

2,427,512. Dicyandiamide-Aldehyde Product. M. J. Scott, Springfield, Mass., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,427,513. Dispersing Copolymer of Vinyl Chloride and Vinyl Acetate in a Ketone and Hydrocarbon Dispersant. C. I. Spessard, Pittsburgh, Pa., assignor to Carbide & Carbon Chemicals Corp., a corporation of N. Y.

2,427,514. Reducing the Rate of Cure of a Rubber-Like Olefin-Diolefin Copolymer Vulcanized with an Oxidizing Agent and a Vulcanizing Agent Which is a Quinone Dioxime Compound, by Adding to the Stock before Cure an Aromatic Compound from the Class of Aryl Polycarboxylic Acids and Anhydrides thereof. R. R. Sterrett, Borough of Totowa, N. J., and F. L. Holbrook, Naugatuck, Conn.,

assignors to United States Rubber Co., New York, N. Y.

2,427,519. In Attaching an Outsole of Non-Vinyl Resin Material to a Plasticized Vinyl Resin Shoe Upper, Applying to the Outsole a Butadiene Acrylonitrile Base Adhesive, and to the Vinyl Resin Upper a Vinyl Resin Base Adhesive Containing a Chrome Salt, Heat Activating the Adhesive on the Outsole, and Pressing the Parts together. L. L. Blyler, Melrose, assignor to Compo Shoe Machinery Corp., Boston, both in Mass.

2,427,532. Composition Including One Part by Weight of Latex Extended with Not More Than Three Parts by Weight of an Aqueous Emulsion of a Cracked Gasoline Distillate Polymer Resin. J. J. Miskel, Brooklyn, N. Y., assignor to Nopco Chemical Co., Harrison, N. J.

2,427,601. Production of an Organic Nitrile from the Group of Acrylonitrile and Succinonitrile. C. R. Harris, Lockport, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,427,695. Preparation of Alkylhalogenosilanes. D. T. Hurd, Schenectady, N. Y., assignor to General Electric Co., a corporation of N. Y.

2,427,618. Liquid Sealing Compound Possessing Thixotropic and Gelling-On-Heating Properties, Including a Stable Mixture of Rubber Latex Dispersion as the Base and a Cold Water Soluble Methyl Cellulose Solution of Low Concentration and High Viscosity. H. W. Nagle, Brooklyn, and J. H. Haines, Forest Hills, assignors to Minex Co., Inc., Long Island City, all in N. Y.

2,427,640. Polymerizable Diester of Sulfonol Diglycolic Acid with an Aliphatic Beta Mono-Olefinic Monohydroxy Primary Alcohol. L. N. Whitehill, Berkeley, and E. C. Shokal, Oakland, assignors to Shell Development Co., San Francisco, both in Calif.

2,427,704. Production of Butadiene from a Mixture of Tetramethylene Oxide and Water. J. E. Bludworth and M. O. Robeson, both of Corpus Christi, Tex., assignors to Celanese Corp. of America, a corporation of Del.

2,427,847. Polymerizing a Material from the Class of Open-Chain Aliphatic Conjugated Dienes Alone and Mixtures of an Open-Chain Conjugated Diene with a Compound from the Class of Aryl Olefins and Alkyl Esters of Acrylic and Methacrylic Acids, in Aqueous Emulsion in the Presence of a Water-Soluble Alkali Metal Pyrophosphate. C. F. Fryling, Silver Lake, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,427,907. Polymerizing Isobutylene to Liquid Hydrocarbons. H. Heinemann and W. A. La Lande, Jr., both of Upper Darby, assignors to Pinedale Corp., Philadelphia, Pa.

2,427,925. Recovery of Isoprene and Piperlyene from a Hydrocarbon Mixture. J. A. Samaniego, San Francisco, and M. Souders, Jr., Piedmont, assignors to Shell Development Co., San Francisco, both in Calif.

2,427,942. Making Vulcanizates of Butadiene-Styrene Copolymer by Compounding with Vulcanizing Agent, Paracumaron Resin and Metal Oxide Filler from the Group of Aluminum Oxide, Iron Oxide, Titanium Oxide, and Zinc Oxide. T. A. Bulfant, Hackensack, N. J., assignor to Allied Chemical & Dye Corp., New York, N. Y.

2,427,966. Coating Composition for Welding Electrodes Including Ligno-Cellulosic Material, and a Binding Material. C. J. Hirschler, New Malden, and W. G. Campbell, Aylesbury, both in England.

## Dominion of Canada

443,830. Moldable Polymer of a Mixture Including Toluene and Acrylonitrile. American Cyanamid Co., New York, N. Y., assignee of E. L. Kropa, Old Greenwich, Conn., both in the U.S.A.

443,842. Thermoplastic Composition Including a Synthetic Thermoplastic Polymer and, as a Lubricant therefor, a Small Proportion of a Lower Alkyl Ester of a Saturated Hydroxy Fatty Acid. Dow Chemical Co., assignee of E. L. Kropscott and M. J. Hunter, all of Midland, Mich., U.S.A.

443,873. Methacrylonitrile. Shell Development Co., San Francisco, assignee of E. E. Marplem and T. W. Evans, both of Oakland, and B. Borders, San Francisco, both in U.S.A.

443,928. Coating Composition for Sheet Metal Containers Which Has High Chemical and Water Resistance, Including a Phenol Aldehyde Resin Which is Heat Convertible, Plasticized and Modified by a Polyvinyl Acetal Resin of an Aliphatic Aldehyde, and a Solvent Mixture Including a Liquid Aromatic Hydrocarbon and a Ketone. American Can Co., New York, N. Y., assignee of W. F. May, Maywood, Ill., both in U. S. A.

443,929. Coating Composition of High Chemical and Corrosion Resistance for Sheet Metal Containers, Including a Water-White Unsatifiable and Substantially Nonacidic Cyclopentadiene Resin Derived from the Hydrogenation of Indene and Coumarone Resins, Milled together with a Compatible Rubber-Like Polymer of Isobutene. American Can

Co., New York, N. Y., assignee of W. F. May, Maywood, Ill., both in the U.S.A.

443,978. Starch-Melamine Molding Composition. A. E. Staley Mfg. Co., assignee of D. W. Hansen, both of Decatur, Ill., U.S.A.

444,058. Synthetic Resinous Material Obtained by Swelling a Mass of a Polymer of Reduced Solubility by Adding a Normally Liquid Monomeric Unsaturated Polymerizable Organic Compound, and then Polymerizing. Distillers Co., Ltd., Edinburgh, Scotland, assignee of H. P. Staudinger, Ewell, and H. M. Hutchinson, Banstead, both in Surrey, England.

444,059. Polymer of a Chlorenchenoid Compound. Distillers Co., Ltd., Edinburgh, Scotland, assignee of H. P. Staudinger, Ewell, and M. D. Cooke, Epsom Downs, both in Surrey, England.

444,065. Film Having Enhanced Resistance to the Passage of Water Vapor Including a Polyvinyl Chloride-Type Resin together with a Dialkyl Ether, Each Alkyl Group of Which Contains 10 to 18 Carbon Atoms. Firestone Tire & Rubber Co., Akron, O., assignee of M. R. Radcliffe, Glen Rock, N. J., both in the U.S.A.

444,066. Composition Including Chlorinated Rubber or Chlorinated Hydrochlorinated Rubber together with a Medium of a Polyalkylene Polyamine. Firestone Tire & Rubber Co., Akron, O., assignee of R. C. Briant, Forest Hills, Pa., both in the U.S.A.

444,067. Bonding a Rubber to a Magnesium Metal by Treating a Surface of the Metal with a Substance from the Group of Fluosilicic Acid, Hydrofluoric Acid in the Presence of a Glass, and a Reaction Product of Hydrofluoric Acid and a Glass, Baking the Treated Surface, Applying an Adhesive Cement, and Heating a Rubber Composition in Contact with the Cement-Coated Surface. Firestone Tire & Rubber Co., Akron, O., assignee of J. R. Rafter, Sharon, Mass., both in the U.S.A.

444,068. Stabilizing Films of Vinyl Resins Compounded with Butadiene-Acrylonitrile Copolymer with the Aid of a Tetraalkyl Thiuram Disulfide. Firestone Tire & Rubber Co., assignor of K. C. Elberly, both of Akron, O., U. S. A.

444,076. Improved Resin Obtained by Reacting a Resinous Compound from the Class of Natural Resins, the Glycerol Esters and the Calcium and Zinc Salts of Such Resins, with a Product Separately Condensed from a Lower Saturated Aliphatic Ketone and an Aldehyde in the Presence of a Catalytic Catalyst. F. H. Levey Co., Inc., New York, N. Y., assignee of J. W. Kroege, Lansdowne, Pa., and H. F. O'Connor, Brooklyn, N. Y., both in the U.S.A.

444,150. Electrical Insulation Including the Thermal Reaction Product of a Copolymer of One of the Group of Styrene, Vinyl Chloride and Vinyl Acetate, and One of the Group of Maleic Acid, Maleic Anhydride and Lower Mono-Alkyl Esters of Maleic Acid with a Dihydric Compound, Carbide & Carbon Chemicals, Ltd., Toronto, Ont., assignee of W. N. Steops and C. E. Staff, both of Charleston, W. Va., and H. F. Wakefield, Bloomfield, N. J., both in the U.S.A.

444,189. Tacky Composition Including a Rubber-Like Polymer of a Diene Hydrocarbon Mixed with a Resinous Product Obtained by Condensing a Singled Aldehyde in the Presence of a Condensation Catalyst with a Cratonaldehyde-Type of Auto-Condensation Product of a Lower Aliphatic Ketone. Shell Development Co., San Francisco, assignee of S. A. Ballard and J. A. Perona, both of Oakland, both in Calif., U.S.A.

444,209. Production of a Cellular Material from Cellulose Acetate. C. G. Bonard, London, administrator of the estate of H. Dreyfus, deceased in his lifetime of London, assignor of J. G. Williams, London, England.

## United Kingdom

590,999. Synthetic Resinous Compositions. Bleachers' Association, Ltd., W. Kershaw and C. J. Whitelegg.

591,058. Synthetic Rubber-Like Material. E. I. du Pont de Nemours & Co., Inc.

591,086. Synthetic Rubber-Like Materials. Imperial Chemical Industries, Ltd.

591,357. Structures Including Iso-Olefin-Diolefin and Like Interpolymers and Other Rubber-Like Materials. C. Arnold (Standard Oil Development Co.).

591,149. Production of Organo-Silicon Compounds by the Grignard Reaction. J. E. Hackford, C. Shaw, and W. E. Smith.

591,221. Silicone Resins. British Thomson-Houston Co., Ltd., (General Electric Co.).

591,248. Triisobutylene. C. Arnold (Standard Oil Development Co.).

591,283. Sulfoxides of Alkylated Phenols. J. C. Arnold (Standard Oil Development Co.).

591,303. Resol Compositions. E. I. du Pont de Nemours & Co., Inc.

591,335. Catalytic Polymerization and Interpolymerization of Ethylene. E. I. du Pont de Nemours & Co., Inc.

591,444. Curing Polymeric Materials. Standard Oil Development Co.

591,946. **Resinous Condensation Products.** Monsanto Chemical Co.  
 591,515. **Adhesive Compositions.** E. I. du Pont de Nemours & Co., Inc.  
 591,551. **Electrical Insulating Compositions.** A. H. Stevens (Mycelac Corp. of America).  
 591,592. **Scratch Resistance of the Surface of Methyl Methacrylate Polymer Articles.** Imperial Chemical Industries, Ltd.  
 591,627. **Synthetic Rubber Compositions.** British Thomson-Houston Co., Ltd.  
 591,714. **Petroleum Hydrocarbon Compositions.** Standard Oil Development Co.  
 591,721. **Suspension Polymerization.** Rohm & Haas Co.  
 591,763. **Rubber or Rubber-Like Product.** R. L. Cleaver (J. Urnston).  
 591,771. **2-Halogenoethoxy Silicon Compounds.** British Thomson-Houston Co., Ltd. (General Electric Co.).  
 591,787. **Plasticizing, Reclaiming, and Re-working Vulcanized Rubber.** Gestetner, Ltd., and A. de Waele.  
 591,799. **Chlorination of Hydrocarbons.** Socomev-Vacuum Oil Co.  
 591,810. **Preparing Organosilicon Chlorides.** British Thomson-Houston Co., Ltd.  
 591,816. **Nitro-Olefins.** Imperial Chemical Industries, Ltd., A. E. W. Smith, C. W. Scaife, and H. Baldock.  
 591,857. **Azeotropic Mixtures of Chlorosilanes.** British Thomson-Houston Co., Ltd., (General Electric Co.).  
 591,860. **Preparing Mixtures of Chlorosilanes.** British Thomson-Houston Co., Ltd.  
 591,863. **Vinylidene Chloride Copolymers.** Disublers Co., Ltd., J. J. P. Staudinger, and D. Faulkner.

## MACHINERY

### United States

2,426,651. **Apparatus for Injection Molding of Resinous Material.** T. F. Stacy, assignor to French Oil Mill Machinery Co., both of Piqua, O.  
 2,426,767. **Vulcanizing Apparatus.** R. Dupont, Epernay, France.  
 2,427,796. **Plastometer for Unvulcanized Rubber and Other Materials of a Rubbery Nature.** H. A. Macdonald, Gravesend, assignor to W. T. Henley's Telegraph Works, Ltd., Westcott, Dorking, both in England.  
 2,427,930. **Apparatus to Produce a Sheath of Extrudable Insulating Material on a Movable Core.** G. H. Sittner, Schenectady, N. Y., assignor to General Electric Co., a corporation of N. Y.

### United Kingdom

591,085. **Injection Molding Machines.** E. M. B. Co., Ltd., and S. Smith.  
 591,457. **Means for Thermally Plasticizing Thermoplastic Materials.** H. C. Young.  
 591,484. **Apparatus to Distribute Powdered Material over a Traveling Surface.** St. Helen's Cable & Rubber Co., Ltd., and D. Burnett.  
 591,656. **Apparatus for Automatic Molding of Plastics.** Bakelite, Ltd.  
 591,844. **Tire Spreader.** Woodhouse & Mitchell, Ltd., E. Sturm, and A. Emmett.

## UNCLASSIFIED

### United States

2,426,590. **Hose Coupling.** G. A. Borg, Naugatuck, Conn.  
 2,426,628. **Device to Support a Tire Casing Internally against Collapse on Deflation of the Tube.** C. F. Mullen, United States Navy.  
 2,426,683. **Traction Device for Wheeled Vehicles.** H. B. Harrop, Middlebush, N. J.  
 2,426,704. **Resilient Vehicle Wheel.** J. T. Murphy, Akron, O.  
 2,426,845. **Cable End Sealing Device.** J. Rogoff, New Rochelle, N. Y., assignor to Burnady Engineering Co., Inc., a corporation of N. Y.  
 2,426,874. **Traction Device for Tires.** P. Ragon, New York, N. Y.  
 2,427,216. **Tire Mounting Rim.** H. T. Kraft, assignor to General Tire & Rubber Co., both of Akron, O.  
 2,427,287. **Safety Valve.** W. B. Kochner, St. Louis, Mo., and L. T. Ward, Philadelphia, Pa., assignors, by mesne assignments, to Knapp-Monarch Co., St. Louis, Mo.  
 2,427,345. **Automatic Dual Tire Equalizer.** A. H. Davidson, East Claire, Wis.  
 2,427,477. **In a Donche Appliance Including a Liquid Carrying Receptacle, Means for Connecting a Discharge Tube in Communication with the Receptacle.** J. Shapiro, Brooklyn, N. Y.  
 2,427,510. **Wheel Anti-Skid Equipment.** J. W. Richardson and J. Cuneo, Wood-Ridge, N. J.  
 2,427,627. **Leak Indicator for Gas-Filled**

**Conductor Cable.** H. Shiroyan, Flushing, N. Y.  
 2,427,685. **Method of Securing Inner and Outer Sleeves to Hose Ends.** C. R. Midtlyng and H. S. Young, Jr., United States Navy.  
 2,427,973. **Tire Chain.** W. F. Merritt, Middletown, N. Y.

### Dominion of Canada

443,922. **Clamp for Hose Connections.** R. Waddell, Hamilton, Ont.  
 443,934. **Tire Inflation Guard to Prevent Accidents during Truck Tire Inflation.** Belmont Body Builders, assignee of N. and B. Winarsky, all of Newark, N. J., U.S.A.  
 444,013. **Machine for Facilitating the Application and Removal of Pneumatic Tires from Their Rims.** C. E. Branick, Fargo, N. D., U.S.A.  
 444,161. **Joint for Electric Power Cables.** International Standard Electric Corp., New York, N. Y., U.S.A., assignee of E. C. Lee, London, England.

### United Kingdom

591,147. **Apparatus to Measure Such Physical States of a Material as Effect the Dielectric Losses therein.** Ferranti, Ltd., Tootal Broadhurst Lee Co., Ltd., M. K. Taylor, and L. G. Nield.  
 591,611. **Production of Adherent or Removable Liners for Hollow Articles.** Imperial Chemical Industries, Ltd., G. C. Tyce, and R. L. Stephens.

## TRADE MARKS

### United States

432,395. **Strex.** Elastic fabrics. United States Rubber Co., New York, N. Y.  
 432,427. **Monomac.** Footwear. Monomac Shoe Co., Inc. Haverhill, Mass.  
 432,431. **Stabelan.** Synthetic resin stabilizers. Stabelan Chemical Co., Toledo, O.  
 432,602. **Hurflex.** Plasticizers. Hardesty Chemical Co., Inc., New York, N. Y.  
 432,772. **Fleecenap.** Shower curtains. I. B. Kleinert Rubber Co., New York, N. Y.  
 432,774. **Tissuelflex.** Woven elastic fabric. Rayflex Fabrics, Inc., New York, N. Y.  
 432,788. **Twinkord.** Conductors and cables. Ansonia Electrical Co., Ansonia, Conn.  
 432,801. **Philco.** Liquid synthetic plastic resin. Philco Corp., Philadelphia, Pa.  
 432,808. **Athlastic.** Elastic bandages. J. W. Stevens, Sparkill, N. Y.  
 432,867. **Monoplex.** Synthetic organic chemicals. Resinous Products & Chemical Co., Philadelphia, Pa.  
 432,868. **Amberol.** Synthetic or chemically modified resinous materials. Resinous Products & Chemical Co., Philadelphia, Pa.  
 432,869. **Aeryloid.** Synthetic resinous materials. Resinous Products & Chemical Co., Philadelphia, Pa.  
 432,877. **Sundex.** Plasticizer. Sun Oil Co., Philadelphia, Pa.  
 432,984. **Ameriplast.** Vinyl plastic film. Ross & Roberts, Inc., West Haven, Conn.  
 433,009. **Tambourine.** Vinyl-type plastic sheeting. Crest Fabrics Corp., New York, N. Y.  
 433,069. **Ovation.** Vinyl-type plastic sheeting. Crest Fabrics Corp., New York, N. Y.  
 433,131. **Representation of two babies asleep on a crib sheet. Crib sheets.** International Latex Corp., Dover, Del.

### Trade Lists Available

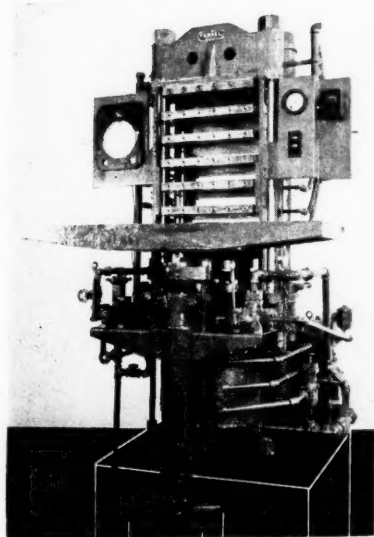
The Commercial Intelligence Division of the United States Department of Commerce recently compiled the following trade lists, of which mimeographed copies may be obtained by American firms from this Division and from Department of Commerce field offices. The price is \$1 a list for each country.

Automotive Equipment Importers and Dealers—Guatemala; Netherlands; Siam; Honduras.  
 Boot and Shoe Importers and Dealers—Netherlands; Brazil.  
 Chemical Importers and Dealers—Angola; Brazil; British Malaya; Indo-China; Union of South Africa.  
 Dental Supply Houses—Portugal; Brazil.  
 Electrical Supply and Equipment Importers and Dealers—Angola; Indo-China; Ireland; Panama; Dominican Republic.  
 Machinery Importers and Distributors—Netherlands; India; Nicaragua.  
 Sporting Goods, Toy, and Game Importers and Dealers—Haiti; Peru.

### Rims Approved and Branded by The Tire & Rim Association, Inc.

RIM SIZE	Sept. 1947
15" & 16" D. C. Passenger	
16x4.00E	479,476
16x4.25E	4,143
16x4.50E	277,618
15x5.00E	28,778
16x5.00F	22,978
15x5.50F	81,833
16x5.50F	3,498
16x6.00F	5,503
16x4.00E—Hump	333,602
15x4.50E—Hump	78,573
16x4.50E—Hump	17,326
15x5-K	184,724
16x5-K	158,152
15x15½-K	15,642
16x5½-K	12,022
15x6-L	35,539
16x6-L	115,635
15x6½-L	39,732
17" & Over Passenger	
19x2.15B	3,552
20x3.62F	617
Flat Base Truck	
17x4.33R	22,219
18x4.33R	311
20x4.33R	26,557
17x5.0	12,858
18x5.0	10,161
20x5.0	11,896
20x5.00S	182,434
24x5.00S	320
20x6.0	86,107
20x6.00S	32,585
15x6.00T	1,235
20x6.00T	49,980
24x6.00T	842
20x7.0	10,159
20x7.33V	82,518
22x7.33V	11,570
24x7.33V	2,156
20x7.5	10,651
22x7.5	3,162
20x8.0	1,891
20x10.00W	398
24x10.00W	1,007
Semi D. C. Truck	
15x5.50F	5,859
16x5.50F	5,359
Tractor & Implement	
12x3.00D	45,682
15x3.00D	11,906
16x3.00D	4,703
19x3.00D	11,209
21x3.00D	1,871
24x3.00D	200
30x3.00D	1,184
36x3.00D	711
38x3.75JA	928
16x4.25KA	11,647
20x4.50E	1,532
22x4.50E	369
36x4.50E	1,135
13x5.50F	2,828
20x5.50F	4,222
24x5.50R	1,369
24x6.00S	2,733
24x8.00T	11,128
28x8.00T	2,632
32x8.00T	1,724
36x8.00T	1,233
44x8.00T	235
W5-24	1,134
W8-24	22,556
W8-36	549
W9-28	5,842
W9-36	815
W9-38	5,491
W10-28	3,308
W10-38	3,167
W10-40	1,572
DW9-38	3,791
DW10-36	95
DW10-38	7,727
DW10-42	1,012
DW11-24	3,612
DW11-28	843
DW11-36	2,860
DW11-38	9,740
DW12-26	683
DW12-30	2,051
DW14-28	862
DW14-30	494
WD14-32	633
WD14-34	462
WD14-42	603
WD16-26	402
Earth Mover	
24x11.25	214
24x13.00	164
24x15.00	2
24x15.00	104
25x15.00	652
29x17.00	233
33x27.00	67
Total	2,673,864

# New Machines and Appliances



Farrel - Birmingham  
Six-Opening Com-  
pression Press

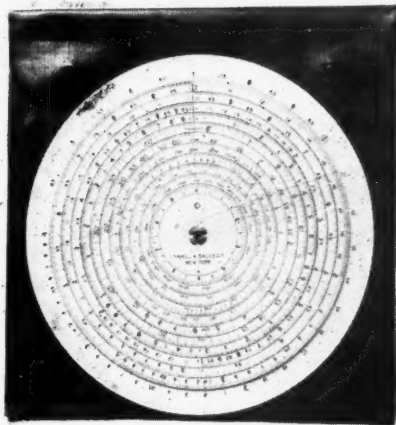
## Molding Press for Rubber and Plastics

**A** NEW 24- by 24-inch, six-opening, hydraulic compression press for molding rubber and plastics articles has been announced by Farrel-Birmingham Co., Inc., Ansonia, Conn. Initial pressure is 2,000 p.s.i., which gives a plate pressure of 614 p.s.i. or a total capacity of 177 tons, with maximum deflection over the platen area of 0.005-inch.

The motor-driven oil-pressure pump is a radial piston duplex type equipped with cooler and filter and mounted on a steel oil tank on the floor back of the press. The pump gives the following operating speeds: closing, 59 inches per minute; pressing, three inches per minute; and lift table rise, 231 inches per minute. Lift table descent is by gravity. Ram operation is by a four-way valve equipped with a hand lever, and the lift table is operated by a separate hand lever valve.

Automatic controls include the blow-down timer which gives intermittent release of condensation from the platens. Next to this timer is the pressure gage with push button control. By adjustment of the pump, the platen pressure may be set at any point from zero to maximum. The temperature control is connected to a condensation chamber, automatically maintains even heat in the platens, and has removable charts for continuous temperature recording.

The press is extremely sturdy in overall construction. Top and follower cross-heads are of cast Meehanite, and the bottom cross-head integral with the cylinder is made of steel. The steel platens are finished on the working surfaces and accurately drilled, tapped, and plugged for steam circulation.



Dualog Circular  
Plastic Log-Log  
Slide Rule

scale. The Dualog comes complete with instruction booklet and leatherette carrying case.



Taber Abraser Showing New Acces-  
sories: Interval Timer, Duplex Refacing  
Stone, and Abraser Drymount

## New Abraser Accessories

**T**HREE new accessories developed for use with the Taber abraser in wear-testing a wide range of materials have been announced by Taber Instrument Corp. The first, the interval timer, is an electrical attachment which permits operating time of abrasion tests to be controlled within predetermined limits. The second accessory is the Duplex refacing stone, a development designed for periodically refacing Calibrase-type abrading wheels. Replacing the abrasive-coated paper disks formerly supplied for this purpose, the stone provides improved control of wheel surfaces, assures more dependable standardization of wheels than previously possible, and is more economical to use than the coated paper disks because of its longer wear life, the manufacturer claims.

The third accessory is the Abraser Drymount, a dual-coated adhesive sheet that simplifies and speeds preparation of thin, flexible fabrics or other similar materials for wear-testing. It anchors the specimen solidly to metal or cardboard backing to prevent wrinkling or buckling of the specimen during test.

## Plastic Slide Rule

**T**HE Dualog slide rule, a circular slide rule 9½ inches in diameter, suitable for desk use or to be carried in a briefcase, has been introduced by Tavella Sales Co. Both disks of the slide rule are made of white vinyl plastic with clear and sharply marked scale calibrations. The transparent cursor or indicator is made of semi-flexible plastic construction to safeguard against accidental breakage.

The rule is scientifically designed and intended for the rapid solution of mathematic problems involving multiplication, division, proportions, trigonometric functions, logarithms, exponential equations, square and cube roots, and powers. The log-log scales provide means for the direct extraction of any root or power of numbers.

Operation of the Dualog can be quickly learned and requires no knowledge of the underlying principles upon which the slide rule is based. All 12 scales are on the face side of the rule, permitting direct transfer of readings from one scale to another without reversing sides and carrying over numbers. All scales are continuous, and readings therefore cannot go "off the end" of the

## New Testing Machine

**A** NEW type of Baldwin-Tate-Emery testing machine for precision testing of plastics, rubber, non-ferrous metals, textiles, fibers, and similar materials, has been developed by the Baldwin Locomotive Works, Philadelphia 42, Pa. Distinguishing features of the machine are its continuously variable 400:1 positive speed range, great horizontal rigidity, complete elimination of backlash, and high accuracy even in the lowest ranges. Its maximum capacity is 5,000 pounds.

Unlike the larger capacity Baldwin-Tate-Emery machine which employ hydraulic loading systems, this machine uses a



## SILASTIC\* fights ice

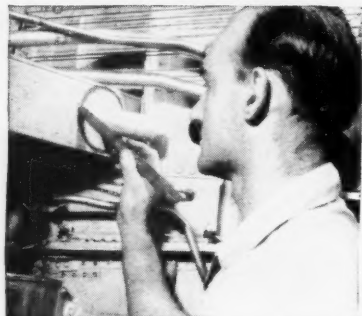


PHOTO COURTESY THE GLENN L. MARTIN COMPANY

Silastic 121 is used to seal hot air ducts in thermal anti-icing system designed for the Martin 2-0-2.

Not content with the more conventional de-icing systems designed to remove ice after it has formed, engineers of the Glenn L. Martin Company developed a thermal anti-icing system for the Martin 2-0-2. This system carries hot air to the leading edges of the wings and tail to keep ice from forming even under severe icing conditions.

Preliminary estimates indicated that impossible amounts of heat would be required. Experimentation proved, however, that conventional thermal calculations do not apply to flight conditions. Combining research with flight testing, the Martin engineers perfected a system so far advanced in principle and performance that it is setting new anti-icing standards for the aviation industry.

As in any original design, the choice of proper materials was of critical importance. A good example is the choice of Silastic 121 to seal the joints in the airducts which operate at 400°F. At such temperatures, other materials which were tested gave off alarming and malodorous volumes of smoke.

Without a heat-stable and resilient caulking material, the efficiency of the heating system would have been severely reduced by leakages. Silastic 121 makes an almost perfect seal and permits the anti-icing system to operate at maximum efficiency even after long exposure to extremely cold, dry atmospheres.

Not used in this application but of related interest is the fact that ice does not adhere to Silastic. The many useful properties of the twelve Silastic stocks now available in commercial quantities are described in pamphlet No. U 21-1.

### SILASTIC STAYS ELASTIC

\*TRADE MARK DOW CORNING CORPORATION

**DOW CORNING CORPORATION**  
MIDLAND, MICHIGAN

New York • Chicago • Cleveland • Los Angeles  
In Canada: Fiberglas Canada, Ltd., Toronto  
In England: Albright and Wilson, Ltd., London



Dow Corning  
Silicone  
Products  
include

### FLUIDS

Damping  
Hydraulic  
Dielectric  
Waterproofing  
Lubricating  
Diffusion Pump  
Mold Release

### GREASES

High Temperature  
Low Temperature  
Valve Lubricants  
Stopcock  
High Vacuum

### COMPOUNDS

Ignition Sealing  
Antifoam A

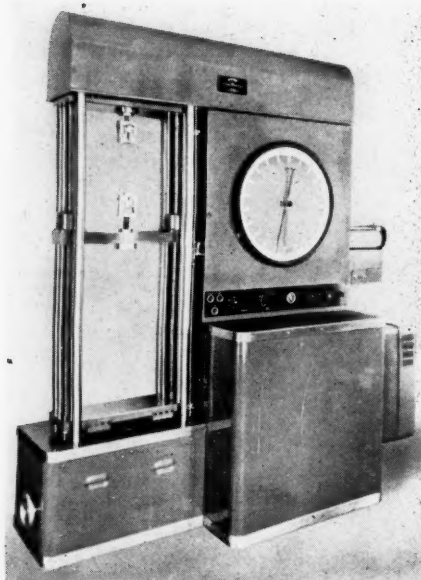
### RESINS

Electrical Insulating  
Laminating  
Protective Coatings

### SILASTIC\*

Molding  
Extruding  
Coating  
Laminating

\*Trade Mark  
Dow Corning  
Corporation



mechanical screw system. The loading cross head is driven by two screws which pass through nuts in the crosshead. These screws are rotated by a 1:1 or 10:1 gear transmission which is driven by a variable speed motor with General Electric Thymotrol control. Speed of loading is variable from 0.05-inch to 20 inches a minute and can be held constant within  $\pm 2\%$ .

In the weighing system the Emery capsule used in most Baldwin testing machines is replaced by a 100:1 mechanical compound lever using flex plates instead of the conventional knife edges at the load points and fulcrums. The specimen is pulled, compressed, or flexed at the short lever end. The long end operates the force balance mechanism of the indicating system. Except for this difference in operation of the force balance mechanism, the indicator is in general the standard Tate-Emery type used on virtually all Baldwin machines. Four ranges are provided: 5,000 pounds in five-pound units; 0-1,000 pounds in one-pound units; 0-200 pounds in 0.2-pound units; and 0-50 pounds in 0.05-pound units. The standard Baldwin guarantee of indication accuracy applies: better than 0.5% of reading or 0.1% of range, whichever is greater.

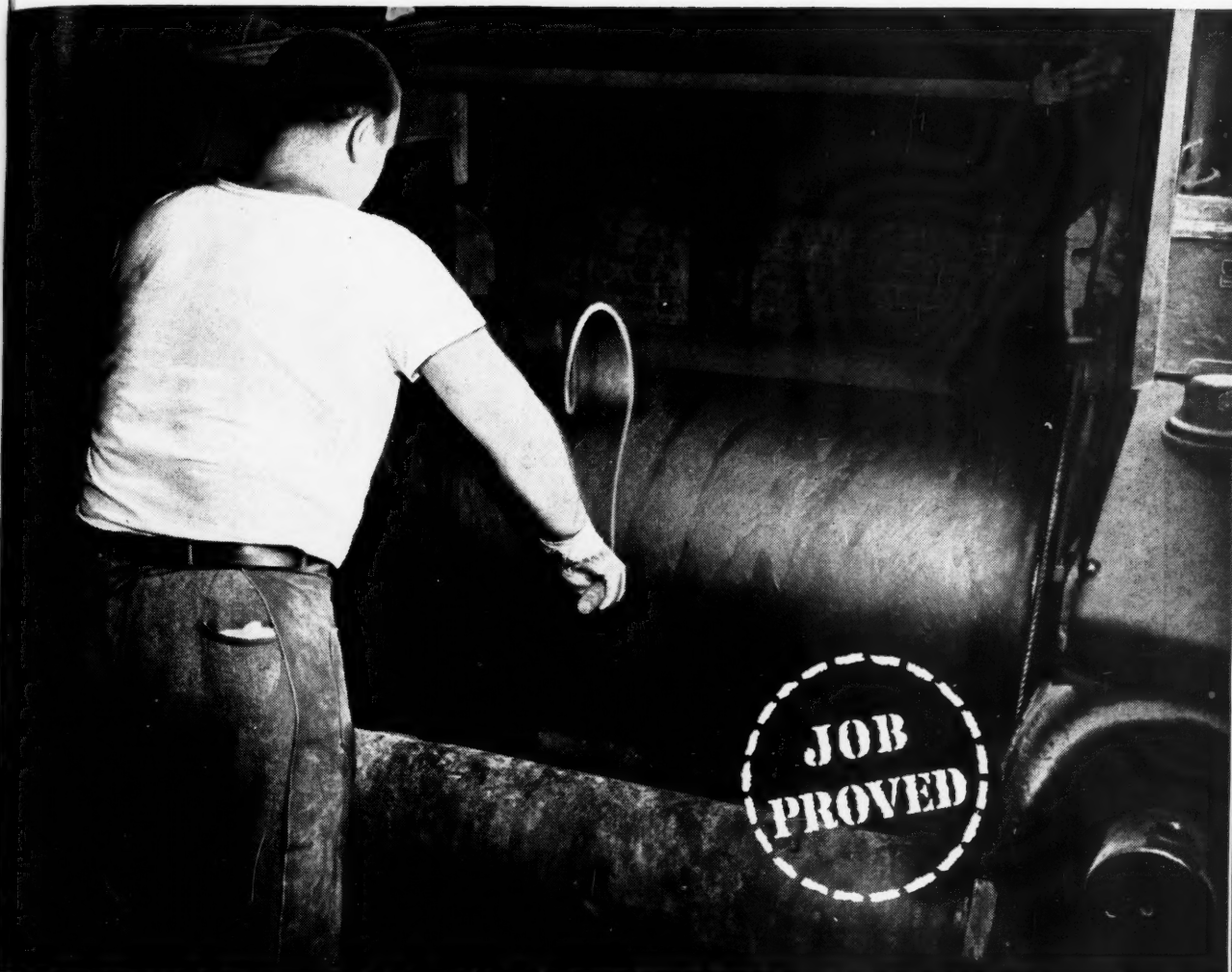
Range change is made by the conventional rotating mask, together with the use of iso-elastic spring units especially designed for quick replacement. Zero adjuster, range selector, maximum dial hand, load rate pacing disk, and other equipment usually found on the larger hydraulic machines is included. The machine is designed to permit the use of standard Baldwin accessories, such as Templin grips, Baldwin extensometers, compressometers, deflectometers, subpresses, and flexure tools, as well as special grips required for various materials.



**FOR RESISTANCE TO CUT AND  
CRACK GROWTH USE PHILBLACK-O**

FOR FURTHER DETAILS, SEE AD ON PAGE 156

# Easy to Handle!



## SUN RUBBER-PROCESSING AID...

**Gives Desired Softness, Speeds Up Milling by 15%**

A manufacturer of hose, gasketing, and other mechanical goods was using cottonseed and paraffin spindle oils as softening agents, but had considerable difficulty in getting the desired product softness.

**A Sun Engineer** recommended a specially refined Sun rubber-processing aid, a carefully selected group of hydrocarbons that have a natural affinity for rubber.

**The desired softness of 20** on the Shor Durometer was readily obtained when the plant switched to this Sun "Job-Proved" material. The rubber was much easier to handle, and milling time was reduced by 15%, with savings in labor and power.

**Sun rubber-processing aids** are highly compatible with natural and synthetic rubbers. They eliminate blooming, cracking, hardening or bleeding. For modern "Job-Proved" rubber-processing aids, call your nearest Sun office.

**SUN OIL COMPANY • Philadelphia 3, Pa.**

*In Canada: Sun Oil Company, Ltd.—Toronto and Montreal*



**INDUSTRIAL  
PRODUCTS**

# DAY RUBBER DISSOLVERS



## TURBINE TYPE

**300  
Gallon  
dissolver  
with  
vertical  
motor  
drive**

The wide range of viscosities which this dissolver will handle, together with a variety in design of the agitator, provides a wide range of applications. When extreme violent mixing action is required, they are equipped with diffusion rings insuring adequate mixing action in the shortest possible time.

Built in working capacities of 80, 150, and 300 gallons.

## THE J. H. DAY CO.

CINCINNATI 22, OHIO

# New Goods and Specialties

## New Basketball

**T**HE new Voit XB20 custom built basketball, culminating 24 years of research, has been announced by W. J. Voit Rubber Corp. The ball is constructed of multiple layers of rubber-impregnated fabric form built by hand over an inflated ball center and enclosed in a molded cover stock of the highest quality. The ball has an attractive appearance, with its light-brown top stock and contrasting dull black seams. A pronounced pebble grained exterior surface provides extra grip and proper handling during play. The ball combines correct "feel" with official weight, size, and performance. The XB20 is the top quality ball in the Voit line and is claimed to wear up to six times as long as ordinary basketballs.



Voit's XB20 Basketball



New HoSavers Rubbers—Extension on Heel Prevents Splashing of Hose

## Anti-Splash Rubbers

**W**OMEN'S rubbers that either totally or partially eliminate splattering of hose have been announced by Kaufman Rubber Co., Ltd. Called HoSavers, the anti-splash rubbers were originally conceived in 1941 and underwent considerable experimentation and development. Final tests made in 1946 with 300 women testers showed that 76% obtained total elimination of hose spotting; while 24% obtained partial elimination, but were satisfied with the results they reported.

Tests showed that water picked up on the heel of women's rubbers drained to the inner corner of the heel, from whence it was thrown on the hose of the other leg. The HoSavers have an extension on the inner corner of each heel. These extensions curve slightly downward and serve as drains for water accumulating on the heel. To obtain proper service from HoSavers in use, it is necessary that they be properly fitted to the shoe and worn on the identical pattern of the shoes on which they are originally fitted. In addition worn-down leather shoe heels are likely to prevent efficient performance. The HoSavers are designed to eliminate splashing for ordinary walking only and are not effective in eliminating splashing caused by careless stepping up and down from curbs and steps.

## Rubber-Coated Baskets

**S**CALDING water, soap, grease, and other kitchen hazards that are harmful to ordinary rubber housewares hold no terror for the new egg and fruit baskets developed by the Woos-



**THE RUBBER THAT RESISTS  
OIL, COLD, HEAT AND TIME**

Enjay Company, Inc., 15 West 51st Street, New York 19, N. Y.; First Central Tower, 106 South Main Street, Akron 8, Ohio; 221 North LaSalle St., Chicago 1, Illinois; 378 Stuart Street, Boston 17, Massachusetts. West Coast Representatives: H. M. Royal Inc., 4814 Loma Vista Avenue, Los Angeles 11, California. Warehouse stocks in Elizabeth, New Jersey; Los Angeles, California; Chicago, Illinois; Akron, Ohio; and Baton Rouge, Louisiana.

Copyright 1947, Enjay Company, Inc.

The spot the cord enters the electric iron is where a rubber bushing takes a beating! It must withstand intense heat . . . constant flexing . . . moisture from steam irons . . . and rough-pull usage.

In introducing its post-war steam iron the SILEX COMPANY wanted an *improved* bushing to meet these requirements. Their engineers worked with the research development men of the ACUSHNET PROCESS COMPANY and, after careful testing, a *Perbunan* cord bushing was selected.

**HERE'S WHY:** Perbunan nitrile rubber *more than meets* the rigid tests of the Underwriters' Laboratories . . . and provides exceptional resistance to deterioration from heat, moisture, aging, flexing and rough handling.

Perbunan also has a new color stabilizer that keeps even the most delicate shades constant . . . with no discoloration of the fluids or materials it contacts.

Whatever rubber problem you may have, our experts will gladly help you solve it. Please write to our office nearest you.

GAUGE MATERIAL *Before*  
MISTAKES and  
*Continuously* with  
the **SCHUSTER**  
MAGNETIC  
CALENDER GAUGE



No, lock the door *before* it's stolen. In this case, "it" means accuracy, production and profit. . . Since 1927 the Schuster Magnetic Calender Gauge has consistently served four important ends:

1. It assures uniform thickness in your finished product, down to 1/1000".
2. It makes hand-mixing unnecessary, saving time and expense.
3. It does away with the human equation, *preventing* mistakes.
4. It saves the stock sampled for calender testing.

The Schuster Gauge does these things by the simple expedient of setting rubber calender rolls to a desired thickness and holding them there. More lately, it has showed itself just as indispensable as "insurance" to synthetic rubber, plastics, cellulose and other materials. The instrument is simple in design, rugged in construction, practically without wearing parts, and adjustable to any thickness.

There is no "stock recipe". Every installation must be engineered to the job. May we tell you what the Schuster Magnetic Calender Gauge can do for you?

Ask for our Bulletin "W"

**THE MAGNETIC GAUGE COMPANY**  
60 EAST BARTGES STREET AKRON 11, OHIO  
— SALES REPRESENTATIVES —  
Eastern BLACK ROCK MFG. CO. Western H. M. ROYAL  
Bridgeport, Conn. Los Angeles, Calif.



Rubbermaid Rubber-Covered Egg and Fruit Receptacle

ter Rubber Co., as the latest addition to its Rubbermaid line. The coating of the wire frame remains undamaged in boiling water tests and other "torture" demonstrations, according to the manufacturer.

Available in either red or white colors, the baskets are offered in three popular sizes to fit any refrigerator: 4½ by 13¾ inches and 7½ by 7½ inches (two-dozen eggs capacity each), and 7½ by 13¾ inches (four-dozen egg capacity). The baskets are easily cleaned, reduce kitchen clutter, will not scratch or mar work or storage surfaces, protect eggs and fruit, and provide full air circulation. In addition they provide full visibility to the busy housewife.

### Water Aerator

**A**ERATED water can now be enjoyed in the home by means of a new aerator which fits onto ordinary kitchen faucets. Produced by Firestone Industrial Products Co., Akron, O., the new device is being sold by department stores in principal cities across the country.

The Velva-Flow aerator forces tap water through more than 1,000 tiny holes to mix it thoroughly with air. Upon emerging, the water is a mass of foam, permeated by millions of air bubbles that make the water clearer, softer, and better tasting. The aerator consists of two small rubber cylinders, one of which fits on the faucet. The assembled unit contains a perforated brass disk that converts the water flow into a series of needle-like, high-pressure jets. These jets are directed against several small screen sections which divert the jets into a mass of splashing water that breaks down into millions of bubbles as air is fed into the miniature waterfall through vents in the side of the spray head.

Addition of air to water speeds up lathering of water with a very small amount of soap. Because soap particles are picked up and washed away more quickly by bubbly water, the rinsing action of aerated water is faster. Because the water is so full of air bubbles, it does not splash, an advantage that housewives will appreciate. Firestone is also producing aerators that can be attached to rubber hose sections for beauty parlors and baths.



Firestone Velva-Flow Water Aerator

"Your Introduction to Philblack O." Philblack Bulletin No. 6, September, 1947. Phillips Petroleum Co., Akron, O. 4 pages. Extensive laboratory test data are presented showing comparative results obtained with Philblack O, Philblack A, and MPC black in natural rubber.

# Accelerators Plasticizers Antioxidants

*A Complete Line of Approved  
Compounding Materials*



*The* **C. P. Hall Co.**  
CHEMICAL MANUFACTURERS

AKRON, OHIO • LOS ANGELES, CALIF. • CHICAGO, ILL. • SAN FRANCISCO, CALIF.

## STAMFORD "FACTICE" VULCANIZED OIL

(Reg. U. S. Pat. Off.)



Our products are engineered to fill every need in natural and synthetic rubber compounding wherever the use of vulcanized oil is indicated.

We point with pride not only to a complete line of solid Brown, White, "Neophax" and "Amberex" grades, but also to our aqueous dispersions and hydrocarbon solutions of "Factice" for use in their appropriate compounds.

Continuing research and development in our laboratory and rigid production control has made us the leader in this field.

The services of our laboratory are at your disposal in solving your compounding problems.

### THE STAMFORD RUBBER SUPPLY COMPANY

Stamford, Conn.

Oldest and Largest Manufacturers  
of

"Factice" Brand Vulcanized Oil

Since 1900

# FAR EAST MALAYA

## Present Condition of Rubber Plantations

It will cost rubber growers more than £23,000,000 to make good the losses of plantation rubber, factories, machinery, and estate buildings and of clearing the plantations of weeds and noxious growths that have been the result of the Japanese occupation, states an official review of the conditions of the principal Malayan industries. The loss of plantation rubber was put at about 2½%. Despite many difficulties, however, estates are rapidly returning to normal, and losses have to some extent been offset by flush yields following the prolonged rest of the trees under the occupation. The revelation of the fact that in 1946 more than 70% of the trees in Malaya were more than 21 years old and that only 12.7% of the total acreage is planted with high-yielding material is calculated to temper expectations of future yields from present stands of rubber.

The details given by E. W. Whitelaw, one of the two members of the Rubber Commission sent by the Ceylon Government to visit Malaya to report on the rubber industry there, amplify the above facts. The members of the commission stayed in Malaya 10 days and were able to see only a relatively small part of the country, but they gathered much information. Mr. Whitelaw expressed himself as much impressed by the fine condition of the older replantings, that is, those that had been sufficiently well-advanced to withstand the neglect that followed the Japanese occupation. Thousands of acres replanted in 1936 and 1937, he said, were in full tapping; they were at least two years in advance of similar Ceylon plantings in growth, and yields of 1,200 to 1,500 pounds per acre were common; in some cases yields of more than 2,240 pounds per acre were obtained. Mr. Whitelaw was careful, however, to add that not all Malayan rubber was like that. None was so bad as is found in certain Ceylon areas, but nevertheless there were some decidedly poor areas. Thousands and thousands of acres were overgrown with weeds and the hard to eradicate of harmful *lalang*. The industry was also suffering as a result of the labor difficulties and the high cost of living; but Mr. Whitelaw too marveled at the rapid rate of recovery in the industry and was full of praise for the courage of Malayan planters during the war.

The report of the United Planters' Association of Malaya also pays tribute to local planters; the Association's Roll of Honor includes the names of 170 European rubber planters, 37 Indians and 6 Chinese.

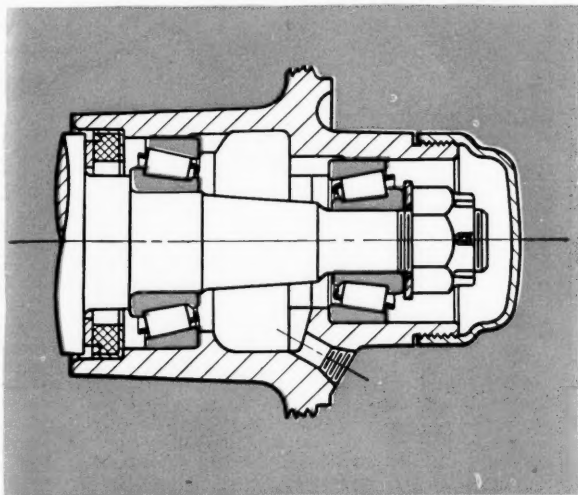
## Latex Preservation

The Rubber Research Institute of Malaya has issued the second edition of its Planting Manual No. 4, "Latex Preservation, Concentration and Shipment," by J. H. Pidford. The first edition, "Latex Preservation and Shipment," by Bishop and Fullerton, was published in 1932. Since then a number of papers dealing with special aspects of the subject have appeared, and the new edition offers a practical review of the present knowledge of latex preservation and shipment as a commercial process in order to assist producers who plan to enter the field. Some of the records of the Institute on this subject have been lost, and records of outside work are widely distributed throughout the literature; hence no claims are made for completeness of the review.

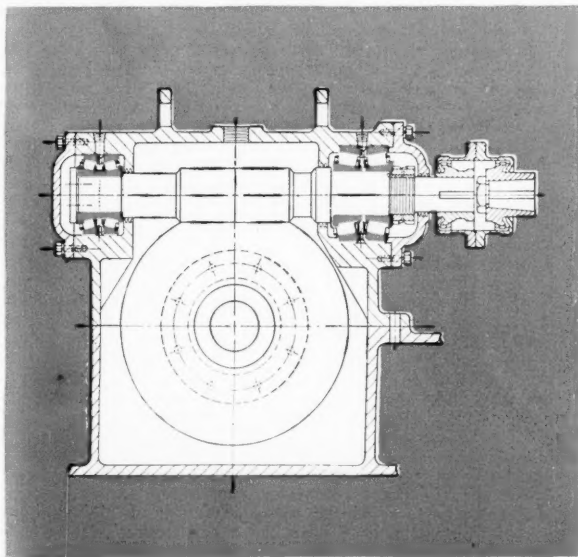
The booklet contains chapters dealing with the important points to be considered in collecting latex in the field (scrupulous cleanliness, early preservation, and maximum uniformity), the handling of ammonia, preservation and bulking of field latex, latex concentration by centrifugal machines, by creaming, and other methods, latex preservatives (ammonia is the most commonly used, but in the Rubber Research Institute it was found that combinations of ammonia and pentachlorophenolate has its advantages), packing and shipping, quality standards for latex, and testing of latex, and finally abstracts of a number of patents relating to concentration and preservation of latex.

In his summary, Mr. Pidford lists a number of practical problems that still require additional research and development work as: (a) a really satisfactory solution of the skim recovery problem in the centrifuging process; (b) a creaming process which

## How to carry combinations of radial and thrust loads



**TRACTOR FRONT WHEEL** in which both thrust and radial loads are carried on single row Timken bearings. From whichever way the load may come, it will be handled with minimum friction and wear.



**APPLICATION** of Timken Bearings on the worm shaft of a worm gear drive. The load on the worm shaft bearings, due to the operation of the worm, is primarily thrust. There is considerable radial load however, arising from the separating force of the gears and also possibly from overhung driving loads. This is another application for which the tapered roller bearing is ideal.

**T**HESE drawings show how Timken tapered roller bearings are effectively used where both radial and thrust loads must be carried. They may give you an idea for projects now on your boards.

Because it is a *roller* bearing, the Timken bearing can carry the heaviest loads. Because its rolls are *tapered*, it can carry both radial and thrust loads in any combination.

From whichever direction the loads may come, this tapered design enables the Timken bearing to carry them, one at a time or simultaneously. The cost of providing a separate type of bearing for each load is eliminated. Bearing housings and mountings are simplified, with a saving in cost, weight, and space.

For help in putting these important advantages of Timken bearings to work in the product you're designing, call upon the confidential service of the Timken engineer. He will help you select the precisely correct bearing for your job.

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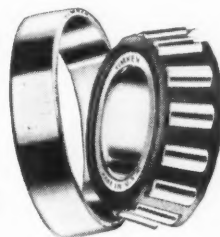
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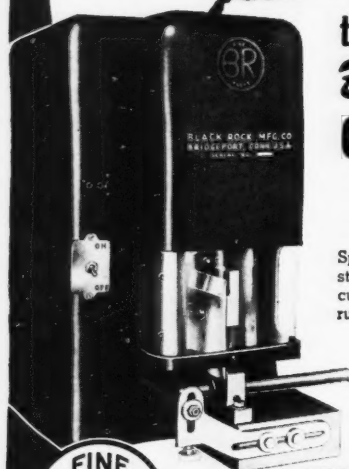
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Finally he points out that only two large producers have practical experience and detailed knowledge of the difficulties associated with bulk shipment, and that such knowledge cannot be obtained in the laboratory, but can only be gained by experience.

### Rubber Industry Has Unsatisfactory Year

An examination of a number of annual reports of Malayan rubber companies covering 1946 or the year March, 1946, to March, 1947, shows that the period was one of hard, uphill work ending in little or no profit for most concerns. Some of the more fortunately situated estates booked modest profits, and a few were even able to turn out the first dividends since 1941, for instance, the London Asiatic Rubber & Produce Co. (10%) and Singapore United Rubber Plantations (4%).

Losses were ascribed to various causes or combinations of causes, as heavy expenditures necessitated for reconditioning work, and reduced efficiency resulting from the loss of equipment and factories by Japanese looting and destruction, lack of adequate facilities for transportation, and labor troubles. The latter have been caused not only by labor union agitation, but in some cases also to competition among employers for scarce tappers, and in at least one case lack of proper accommodation led to drifting and absenteeism among labor. Last but not least is, of course, adverse relation in many cases between the cost of production and current rubber prices.

Several companies plan to strengthen their position by increasing outputs and eventually cutting costs by planting new lands and replanting old areas with modern high-yielding buddings and seedlings, but such conversion is in many cases being slowed down by the present high cost of labor and materials. Certain companies are contemplating the production of types of rubber which command a premium over ordinary grades; some are already resuming the manufacture of sole crepe and the exportation of liquid latex; others who never had entered this field before are now considering the erection of necessary buildings and the procurement of machinery for these purposes. Among the companies considering shipping liquid latex may be mentioned Consolidated Malay Rubber Estates. Several companies of the Harrisons & Crosfield group have formed a cooperative concern to undertake the concentration of latex.

Meanwhile the low level of rubber prices is calling forth much criticism of America and her continued use of synthetic rubber, and once again the cry for restriction of outputs, this time as a long-term proposition, is beginning to be heard. A body known as the Malayan Democratic Union is apparently lashing out in all directions at once. It wants the British Government to float a corporation for the manufacture of tires from natural rubber so as to encourage the consumption of Malayan rubber; it rages against the United States' insistence on the use of synthetic rubber and Malayan helplessness because problems vital to Malaya are being settled in London and New York without her knowledge, and it is sure the American rubber policy is making the American-way of life very unpopular in Malaya; and finally it clutches at self-government as a cure for all of Malaya's economic troubles.

"If we had self-government," the Union is quoted as saying, "we could build up a balanced economy not completely based on the production of rubber and tin and in this way improve our chances of surviving the impact of a slump. To obtain power to mold the economic future of Malaya is one of the most important reasons for our demand for self-government."

### Malayan Planting Industries Employers' Association

The recently formed Malayan Planting Industries Employers' Association seeks to unify all owners in Malaya of rubber, palm oil, and coconut estates of 50 acres and over. The Association, which expects to have a council of 44 members, hopes to secure mutual support and cooperation in dealing with demands by employees and unions, to encourage payment of equitable wages, and to settle disputes. Members will be required to carry out the rules of the Association, not to declare a lockout without giving the Association adequate notice, and not to engage labor on strike employed by another member.

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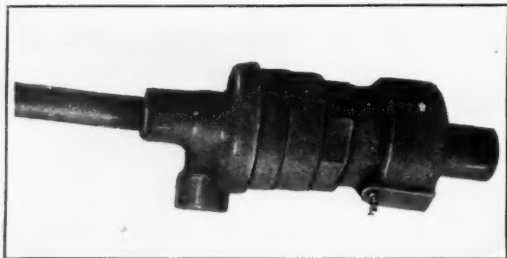
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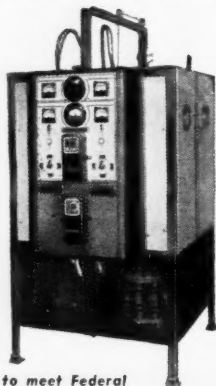
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### Report on the Rubber Research Institute

A report on the Rubber Research Institute of Malaya states that of the 25 prewar senior staff members, six lost their lives; several were prisoners of war and apparently left after the liberation; only 13 of the original staff returned to the Institute, which was able to operate under the Japanese occupation, and fortunately most of the junior staff was retained. It was largely due to the care of the latter that the Institute suffered much less than was feared would be the case. Even so, there were serious losses of records and laboratory equipment, especially in the soils and chemistry sections. What are considered to be the most important of the Institute's researches—those concerning the development of pedigree material—suffered least; complete records of the valuable new seed parents and high-yielding clones were preserved, thus making possible immediate resumption of the testing and further selection of new planting material.

### Rubber Production Increasing

Rubber production on estates of 100 acres and over reached the record amount of 33,366 long tons of rubber in July; with the 20,407 long tons from small holdings, the total for the month was 53,773 tons. The output on estates of 100 acres and over in the first seven months of the current year came to 198,517 long tons, and on small holdings to 166,115, making 364,632 tons in all. This figure compares with 340,708 tons in the same period of 1941, when larger estates produced 210,383 tons and small holdings 130,325 long tons.

### Imports and Exports of Gutta Percha and Jelutong

During the first half of 1947 Malaya imported 211 long tons of gutta percha, chiefly from Sarawak (110 tons) and Netherlands India (80 tons). In the same period Malaya exported 269 tons of gutta percha, of which 203 tons went to the United States, 56 tons to the United Kingdom, seven tons to Germany and three tons to France.

Jelutong imports in the first six months of 1947 totaled 1,592 long tons, with Sarawak supplying 1,249 tons and Netherlands India, 280 tons; small amounts were also sent by British North Borneo, Siam, and Brunei. Practically the whole of the 1,314 tons of jelutong exported by Malaya in the first half of 1947 went to the United States.

### New Taxation

The Heasman tax report recommending a tax of about 3% on income over 6,000 Straits dollars and a flat 20% on company profits has aroused much comment. There seems to be widespread criticism of government spending and a feeling that the public should know the details of the expenditure of Malaya's prewar reserves before new taxation is approved.

Malaya now imposes a 20% ad valorem duty of tires and tubes for motor vehicles in cases where the full rate applies; but these goods enter duty free under the preferential rates. Where the full rates apply, cycle tires imported into the Malayan Union pay 15 Straits cents per cover; the preferential rate is eight Straits cents; on cycle inner tubes the rates are six and three Straits cents per tube, respectively.

## CEYLON

### Recommendations of the Rubber Commission

The Rubber Commission appointed to investigate the local rubber industry and to suggest methods of rehabilitation handed in its report to the government on July 7. According to local press versions, uneconomic areas were discussed, and suggestions offered with regard to the improvement and exploitation of plantations and the development of rubber manufacturing in the island.

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holdings with outputs under 200 pounds per acre were considered uneconomic. The Commission estimated the present uneconomic area at 175,000 acres. However some borderline estates and holdings now included in the economic groupings might become uneconomic within a year or so, when the uneconomic area would be raised to 200,000 acres—out of a total of 650,000 acres. As alternative to rubber on the substandard areas, the Commission recommended paddy in low-country districts, tea in up-country districts, and coconuts in the Kurunegala district. To reduce costs and promote efficiency, amalgamation of smaller estates to form units of 2,000 to 5,000 acres was advised. Combination was also recommended for small holdings, with government assistance for them in the form of increased numbers of small cooperative smoked sheet factories, subsidization of the purchase of machinery, and measures to improve the quality of their rubber.

As to manufacturing, the recommendations covered both the preparation of special types of rubber and the production of rubber goods, preferably by private enterprise, with the government taking the initiative where necessary. It was suggested that the concentrated latex industry should be given all encouragement and should be left to private enterprise in the first instance, but no monopoly should be granted to any firm to operate in one district. A permanent committee should be established to coordinate and deal with arrangements regarding transport, storage, and shipping of latex. At the same time the government was urged to establish a central factory for the production of creamed latex, sheet, blanket crepe, sole crepe, and softened rubber.

The Commissioners were much impressed by what they had seen during their visit to Malaya of local manufacture of rubber goods; Malaya, they found, produced practically all her own rubber needs except automobile and truck tires and even exported rubber-soled canvas shoes to Ceylon. It was felt that Ceylon could and should produce more types of rubber goods than at present, and the Commissioners recommended the establishment of a bicycle tire and rubber shoe factory similar to those in Malaya, which would make not only footwear and cycle tires and tubes, but also tires for rickshaws and bullock carts, and other rubber goods. If there was a lack of successful private enterprise, the government itself should start such a factory.

To encourage private enterprise in the manufacture of rubber goods, the government should obtain priority on imports of necessary machinery and should waive the customs duties for a definite period. Furthermore importation of articles already being manufactured here, as heels and soles, erasers, balloons, vulcanized rubber compounds, and balls, should be restricted or banned.

The Rubber Service Laboratory being organized by A. Sundaralingam, the government rubber technologist, who served as secretary to the Rubber Commission, is to provide technical advice to private manufacturers.

The Commission advised against any steps being taken as yet toward the manufacture of automobile and truck tires.

Later news from Ceylon announces the sudden death, just ten days after completing his report, of the Ceylon member of the Rubber Commission, the well-known rubber planter, S. F. H. Perera.

The Commissioners' suggestions regarding replanting are evidently to be carried out immediately, for several million clonal seeds have reportedly just been ordered from Malaya.

### Government Losses on Rubber Subsidies

The Ceylon Government is understood to be losing an average of about 1,500,000 rupees a month by subsidizing rubber. The government continues to pay a floor price of 65 rupee cents for No. 1 sheet; 62½ cents for No. 2 sheet; 60 cents for No. 3; 54 cents for No. 4; and 52 cents for No. 5. However it no longer buys pale crepe and scrap crepe.

The Rubber Commissioner sells the rubber only to shippers, but does not ship rubber to foreign countries so as not to interfere with the trade. Price offers made to the Commissioner by purchasers are said to range from 40 to 50 rupee cents per pound, depending on the grade, and the loss therefore ranges from 15 to 8 cents per pound. Demand is said to be greater for the lower than for the more expensive grades of rubber. During June, 1947, the Rubber Commissioner reportedly bought 5,000 tons of rubber and was able to sell only 1,000 tons.

Ceylon's exports of rubber have steadily and sharply declined in the second quarter of 1947. In April exports were 7,448 long tons, in May, 3,420, and in June, 2,698 long tons, in all 13,566 long tons. During the first six months the total was 32,740 long tons. The exports of latex underwent an even more drastic decline in June. While shipments for the first half

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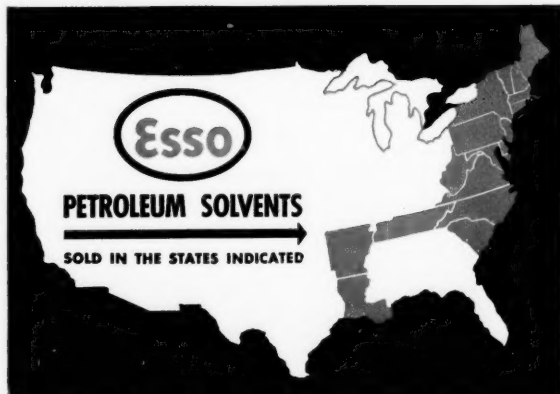
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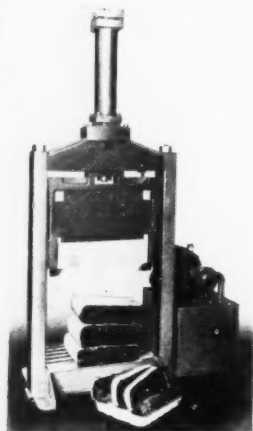
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totalled 611,603 pounds, those for June were only 2,327 pounds. The United States took more rubber from Ceylon during the first half of 1947 than in the entire year in 1946; but it has bought no latex from Ceylon during the current year.

## INDIA

### Bhilawan Shell Liquid

Bhilawan shell liquid has long been used in India for medicinal purposes, but recently considerable interest has been shown in the possibilities of the material for industrial purposes. The liquid is obtained from the pericarp of the Bhilawan nut, the product of a tree which grows in the hotter parts of India and also in the West Indies and Australia. The nut is really the lower part of a fruit about one inch long and almost as wide and consists of a smooth, black shining pericarp containing a corrosive, resinous juice which is brownish or black when the fruit is ripe and has strong vesicant properties.

Analysis made in India in 1925 seemed to indicate that the juice contained the following constituents: catechol, 0.4%; anacardol, 37.3%; two phenolic acids,  $C_{17}H_{10}O_2$  and  $C_{15}H_{10}O_2$ , 4.4%; another acid and sugar. Later observations in India showed no anacardol or catechol present; instead the constituents were found to include: semecarpol, 0.1%, this is a monohydroxyphenol with boiling point of 185-190° C. at 2.5 mm. and solidifying below 25° C. to a fatty mass; bhilawanol, an ortho-dihydroxy compound,  $C_{21}H_{32}O_2$ , 40%, distilling at 225-226° C. at 3 mm. and solidifying below 5° C.; and a tarry corrosive residue yielding no identifiable compound.

In 1942 an Indian investigator published a paper on the preparation of baking enamel from Bhilawan shell liquid, using for his tests the product obtained by extraction of the crushed whole nuts with cold gasoline. He was able to make stoving enamels with hard glossy elastic properties and with good resistance to water, acid, gasoline, alkali, and heat. Other investigations carried out since 1940 under the auspices of the Board of Scientific and Industrial Research, India, led to the development of non-vesicant semi-solid products useful in the manufacture of lacquers, varnishes, enamels, insulating materials, and molding plastics. It was further found that when Bhilawan shell liquid was boiled with formaldehyde and hydrochloric acid, or heated with a metal catalyst, or heated to 200° C. with 0.5 to 5% of sulfur, it yielded a black resin which, when thinned with solvent and applied to metal surfaces and baked at 140-200° C., formed very tough, hard, elastic films resistant to acids, alkalis, and most organic solvents and withstanding temperatures as high as 300-350° C. The liquid has also been employed in reclaiming waste rubber for the production of hard, semi-hard, and soft rubber goods.

Large-scale production of Bhilawan shell liquid was not started until 1943 when a process was evolved by which a semi-polymerized product was obtained which does not contain bhilawanol. Where this substance is essential, the semi-polymerized product can therefore not be used, but it is said to be suitable for the production of enamels, lacquers, varnishes, and certain other plastic compositions.

Most of the research work on bhilawanol shell oil has been done in India, by Indians, notably S. Siddiqui; but investigations have also been carried out in America by S. Caplan and W. F. Schaufelberger (U. S. patent Nos. 2,338,230-31, 1944) and M. T. Harvey (U. S. patent No. 2,368,709, 1945.)

According to reports from the Central Provinces, Madras and Hyderabad, it should be possible with proper organization to collect about 50,000 tons of these nuts yearly.

### Miscellaneous Trade News

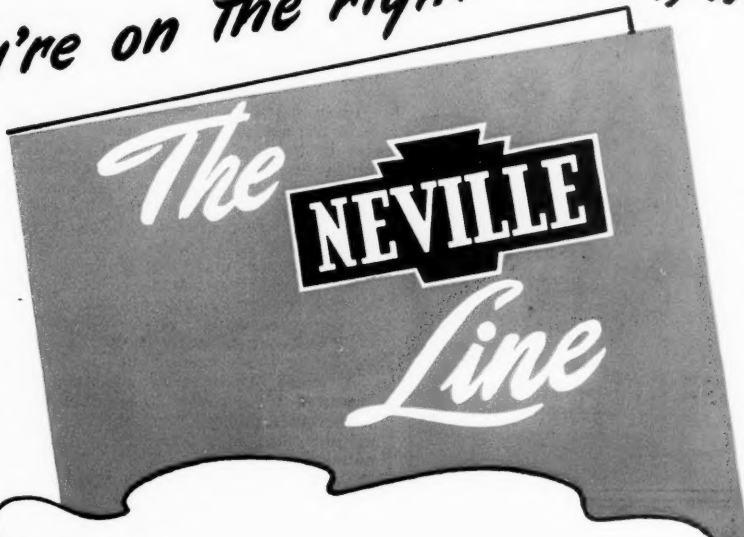
The government of India has declared itself in agreement with the India Tariff Board that the local rubber industry has practically no case for protection. The rubber trade, however, is to be enabled to import machinery from any part of the world.

Now the Indian plastics industry is seeking protection by the India Tariff Board.

A new Indian Rubber Board has just been formed including representatives of the governments of the Dominion of India, of Madras, Travancore and Cochin, and also producers' and manufacturers' associations. The new organization has under its consideration the constitution of a rubber price advisory committee, the fixing of maximum and minimum prices for

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Import licenses will no longer be issued on various goods including rubber bands, erasers, stamps and rubber hand rollers for cyclostyling, boots and shoes containing rubber, goggles, sunglasses and the like and frames, balls, balloons, and toys, and other plastic manufactures.

Indian students who had studied chemical engineering in the United States have been responsible for the formation of an Indian Institute of Chemical Engineers with headquarters in New Delhi. It is proposed eventually to have branches in 14 cities and to publish a technical periodical.

## NETHERLANDS INDIA

### Rehabilitation Schemes

From the latest bulletin of the Rubber Growers' Association it is learned that notwithstanding the continued political unrest in the Netherlands Indies, the Netherlands Indies Committee in cooperation with the Federation of Associations, Amsterdam, the Algemeen Landbouw Syndicaat in Java, and the R. G. A. Local Committee, Batavia, have examined schemes providing for the re-establishment of estate operations and the disposal of produce as soon as the pacification of the areas concerned made this possible.

An organization has been formed for selling and exporting produce as it becomes available, known as the Centrale Verkooporganisatie van Ondernemingslandbouw Producten (C.V.O.), which evidently is the Central Sales Organization for Estate Produce, mentioned in the Washington report above.

A memorandum containing suggestions on the preparatory measures for financial and economic reconstruction in the Netherlands Indies, with special reference to the plantation industry, has been prepared by the Netherlands Indies Committee.

On May 17, 1947, J. S. Sinninghe Damste took up office as chairman of the Algemeen Landbouw Syndicaat.

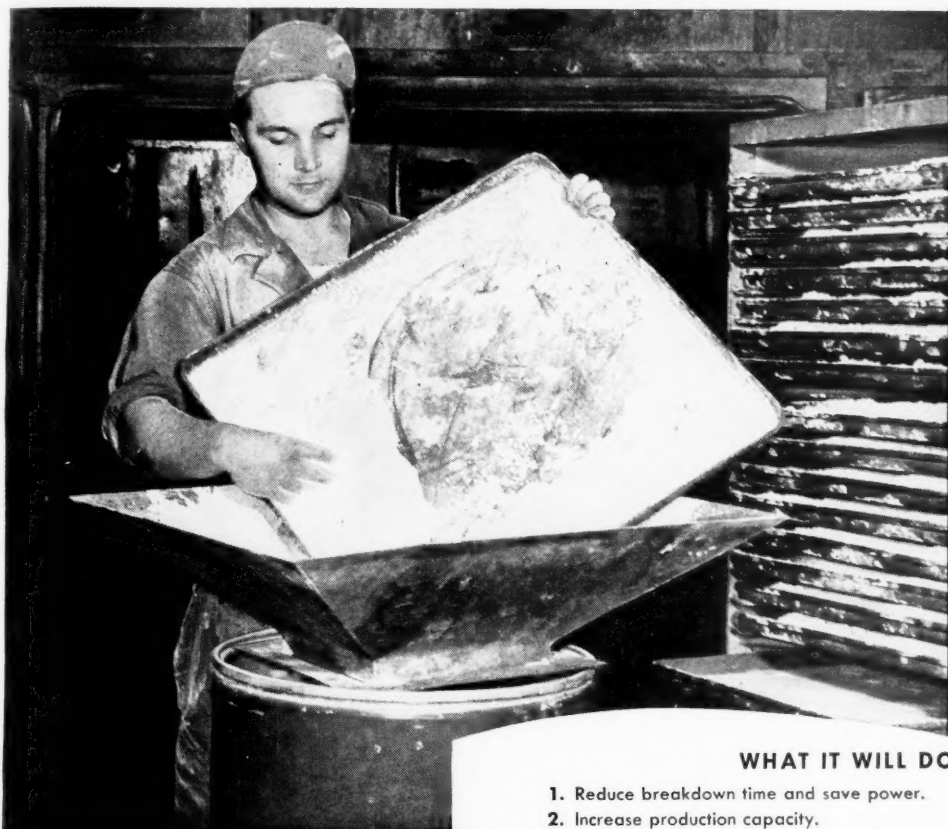
### Shipping Difficulties

According to advices relayed to Washington, The Netherlands authorities closed Sumatran ports on July 28, 1947. On August 25, Belawan-Deli, Tandjong Poera, Tandjong Bali (Asahan), and Palembang were reopened to normal trade, and Djambi was open to shipping, provided ships obtained the necessary sailing permits at Tandjong Pinang or Palembang. The other ports on the East Coast of Sumatra remained closed.

On August 27 the Netherlands Consulate General at Singapore issued a statement pointing out that the regulations of the Netherlands India Government were directed against the

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8. Reduce heat developed in processing and thereby lower the processing temperatures.
9. Improve processing qualities and reduce rejects.
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exportation from Netherlands India of estate products and other property to which no Indonesian could claim ownership and also against smuggling of arms into territories in republican hands.

Meanwhile these measures have had the effect of reducing supplies of native rubber to Singapore, and according to one Malayan paper, this state of affairs might force the 13 rubber remilling factories in Singapore, employing some 7,000 workers, to close down.

After military action was begun by the Netherlands Indies Government in last July considerable stores of produce were recovered, particularly at Cheribon. The Department of Economic Affairs revealed that some 5,000 tons of rubber were shipped from Cheribon since July 21. Of this, 3,000 tons were sent to the United States by an American vessel; while the remainder was sold to the Netherlands for resorting and ultimate disposal. Greater quantities for export have not yet been available because of difficulties in moving produce in liberated areas to ports. It is pointed out that the export of this produce is being handled by the Central Sales Organization for Estate Produce so that rubber exports by Rubberfunds no longer represent the entire quantity of rubber shipped abroad.

## **INDO-CHINA**

In 1944 the *Institut de Recherches sur le Caoutchouc en Indo-chine* (Indo-China Rubber Research Institute) issued a limited edition of the first volume of its organ, *Cahiers I.R.C.I.* (I.R.C.I. Papers). It has only now been possible to publish the second volume. In a foreword of the present issue it is announced that this new periodical is to be made up of four parts: the first is to include two or three original articles; the second, statistical data, chiefly on production in Indo-China; the third, notes on the activities of the Institute during the preceding period, between issues; and, finally, abstracts of recent literature on rubber.

The volume which has just come to hand (Volume II, 1946, 90 pages) includes a fairly lengthy article by M. Bocquet on the possibilities of improving production and quality of raw rubber; a note on thinning out experiments at Quanloi, by M. Ehret; and an article on black stripe disease of the tapped bark, by F. Bugnicourt. H. Berland presents detailed tables on the areas under rubber in Indo-China in his survey of *Hevea* cultivation in Indo-China. The volume also contains numerous illustrations.

## **AUSTRALIA**

As part of its dollar-saving drive, Australia has banned the import from dollar areas of 32 categories of goods, including tires and tubes, gloves, crown seals, plastic pliable sheeting, Pliofilm, and corsets. Limited quantities of rubber thread for the manufacture of golf balls will be allowed to enter and also chicle.

Figures covering Australia's rubber trade in the period from July, 1946, to February, 1947, show a considerable increase in the values of both imports and exports. Total imports of rubber and rubber manufactures came to £3,305,000, which compares with £1,752,000 and £1,010,000 in the same periods of 1945-46 and 1938-39, respectively. Exports in the eight-month period of 1946-47 totaled £A.744,000, against £A.330,000 and £A.56,000 in the corresponding periods of 1945-46 and 1938-39, respectively.

## **SPAIN**

A special negotiator is to be sent by the Spanish Government to Bolivia to conclude far-reaching commercial agreements between Spain and Bolivia. Among other matters to be discussed will be the purchase by Spain of 1,000 tons of rubber per annum from Bolivia for a period of three years; it is expected that the price will be \$1 per kilo, c.i.f. Belem do Para.

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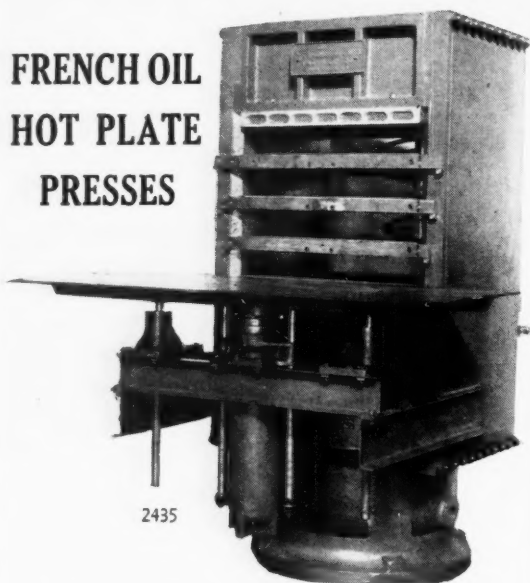
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# Editor's Book Table

## BOOK REVIEWS

**"The Chemistry and Technology of Plastics."** Raymond Nauth. Reinhold Publishing Corp., 330 W. 42nd St., New York 18, N. Y. Cloth, 9 by 6 inches, 530 pages. Price, \$9.50.

This book presents a practical approach to the chemistry and technology of plastics to serve as a course of instruction for those interested in the plastics industry. It is written in simple and clear language and is profusely illustrated with chemical formulae, tables of physical properties, charts, diagrams, and photographs of products, methods, and manufacturing processes.

The text is divided into five sections. The first section, on thermosetting resins, comprises seven chapters devoted to thermosetting plastics, amino resins, thermosetting cast resins, amine-aldehyde resins, the viscous resins, and laminates. Section II consists of a chapter on vinyl polymers and copolymers, and one on acrylic, polyamide, organic silicon, and polystyrene resins. Two chapters on cellulose plastics comprise the third section. Section IV consists of a chapter on synthetic rubber, rubber-like plastics and copolymers, another on protein plastics and natural resins, and a chapter on resin-bonded plywood and veneer. The concluding section is a chapter on mold design, presses, and equipment. An appendix of conversion and other tables, and a glossary of plastics and plywood terms are included together with an adequate index.

Having been written early in 1946, the many advances in plastics made since that time are necessarily omitted. This handicap is especially apparent in the chapter on synthetic rubber which covers the field up to 1945 and gives no inkling of the many changes which have taken place since then. In addition the coverage of the rubber field is rather general in nature, with little specific information on properties, and with no mention of the silicone rubbers.

**"Yarn and Cloth Calculations."** Lloyd H. Jackson. Textile Book Publishers, Inc., 303 Fifth Ave., New York 16, N. Y. Cloth, 5 1/4 by 8 1/2 inches, 204 pages. Price, \$6 in U. S. and Canada; \$7 elsewhere.

This volume presents the yarn and cloth calculations used in weaving in a form suitable for textile students, as well as the textile designer, analyst, and technician. The various yarn systems are explained in detail, and the mathematical calculations relating to each are developed in such a manner that they may be applied directly to mill processes. The factors applying to yarn and cloth calculations and analysis are correlated as simply as possible. In addition problems are appended to each chapter to help the student adapt the various formulae to practical applications.

The sequence of chapters follows the logical development of the subject. Starting with calculations on yarn numbering systems there follow chapters on converting from one yarn system to another; ply yarns and resultant counts; gray cloth calculations; warp calculations; filling calculations; cloth calculations; the theory of fabric construction; calculations based on fabric analysis; and fabric analysis. Besides an index, a list of engineering constants for textile engineers also appears at the end of this book.

**"Dictionary of Foreign Trade."** Frank Henius. Prentice-Hall, Inc., 70 Fifth Ave., New York 11, N. Y. Cloth, 9 by 6 inches, 980 pages. Price, \$12.50.

This second edition of the dictionary has been completely revised and rewritten to include postwar changes in foreign trade terms and practices. It presents in one compact volume the definitions of foreign trade terms, usages, practices, procedures, and abbreviations, alphabetically arranged for ready reference. Its 6,000 principal entries give specific and detailed information on all aspects of foreign trade. A valuable feature is the reproduction of some 300 documents used in trade, with each document explained in detail. This dictionary also includes a table of some 3,000 foreign trade abbreviations used in English, French, Spanish, and German. An unusually complete weights and measures section presents detailed comparison of the metric system with our own and provides tables for instant conversion between the two systems. Subjects covered by the book include buying, selling, shipping, insurance, importing, exporting, chartering, forwarding, invoicing, commission, collections, customs, banking, credits, finance, and communications.

**"Practical Emulsions."** Second Edition. H. Bennett. Chemical Publishing Co., Inc., 26 Court St., Brooklyn 2, N. Y. Cloth. 5½ by 8½ inches, 568 pages. Price, \$8.50.

This second edition of the standard practical work on emulsions has been completely rewritten and brought up to date. Additional matter on the partial fatty acid-esters of polyhydric alcohols and their applications has been included. Special sections have also been added on the use of soap, lecithin, and pectin as emulsifying agents. Also new is a symposium on industrial emulsions and their use in synthetic latex, leather, dyeing and coloring, polishes, paints, and cosmetics.

As in the previous edition, the first part of the book is devoted to general information on emulsions, emulsifying agents, methods, formulation procedures, equipment, and related subjects. Part II, the symposium, consists of papers on emulsifying agents and emulsions. Numerous emulsion formulae, grouped according to their nature and fields of application, comprise the third and concluding part of the book and include a chapter on resin and rubber emulsions.

## NEW PUBLICATIONS

**"Natac."** J. M. Huber Corp., 342 Madison Ave., New York 17, N. Y. 4 pages. The physical and processing characteristics of Natac, a new bloom inhibitor for natural and natural-GR-S rubber stocks, appear in this bulletin, together with typical formulations and results obtained for the use of Natac in natural rubber carcass, outsole, and molding stocks.

**"Southwark Steam Platen Presses."** Bulletin 254. Baldwin Locomotive Works, Philadelphia 42, Pa. 12 pages. This bulletin describes and illustrates the company's line of Southwark steam platen presses, from the standardized units to presses custom built to individual specifications. Operating data for each press are given.

**"Comparison of Calcene T with Various Calcium Carbonate Pigments in Natural Rubber."** Columbia Pigments Data Sheet No. 47-6. Columbia Chemicals Division, Pittsburgh Plate Glass Co., Pittsburgh 13, Pa. 41 pages. Extensive test data are presented in tables and summarized in graphs comparing Calcene T with Kalvan, Kalite, Witcarb R, Atomite, Surfex, Millical, and Keystone White under various loadings. Two types of acceleration, thiazole and guanidine, were used for most of the work; the comparison between Calcene T, Kalvan and Witcarb R, however, was done using benzothiazyl disulfide. Both dry and masterbatch mixing of the pigments was employed. Three other non-black pigments, zinc oxide, aluminum hydrate, and iron oxide, were also included for comparative purposes.

**"Link-Belt Herringbone Gear Units."** Book No. 1819. Link-Belt Co., 307 N. Michigan Ave., Chicago 1, Ill. 68 pages. This is a combined catalog and data book on the company's herringbone gear units. Complete selection and application data appear, together with information on dimensions, power ratings, lubrication, and allowable pull on shafts. Also included are illustrations of many installations.

**"NA-11. An Accelerator for Neoprene and Neoprene Latex."** Report No. 47-5, August, 1947. R. R. Radcliff and R. H. Walsh. E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del. 8 pages. This new accelerator is recommended for use in all types of neoprene and neoprene latex compositions. It is readily dispersed, economical to use, and provides safe processing. It does not adversely affect the stability of neoprene latex compositions.

**"Photolysis of Rubber."** L. Bateman. British Rubber Producers' Research Association, 48 Tewin Rd., Welwyn Garden City, Hertfordshire, England. Publication No. 81. 9 pages. In the absence of oxygen, irradiation with ultra-violet light rapidly causes rubber to become insoluble and promotes the evolution of small amounts of gas, mainly hydrogen. Isoprene is not evolved in appreciable quantities unless the rubber is simultaneously heated to a temperature exceeding 150° C.

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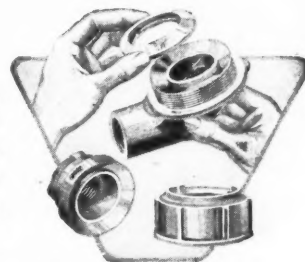


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"Cabot Pine Products." Vol. II, No. II, September, 1947. Godfrey L. Cabot, Inc., 77 Franklin St., Boston 10. 30 pages. This technical bulletin describes the pine products manufactured by the retort chemical division of Cabot Carbon Co. Data on physical and chemical properties of each product are given, together with information on shipping containers, and a description of the material's applications. Also included are sections on definitions of terms and on A.S.T.M. testing procedures for distilled pine products.

"Anthragen Yellow GKR Conc. Pdr." General Dyestuff Corp., 435 Hudson St., New York 14, N. Y. 3 pages. Information on the properties and uses of this new pigment is given herein, together with a sample color strip. The pigment is recommended for use in rubber where weak yellow shades having good lightfastness are desired.

"A.S.M.E. Mechanical Catalog and Directory, 1948." Thirty-Seventh Annual Volume. October, 1947. American Society of Mechanical Engineers, 29 W. 39th St., New York, N. Y. 746 pages. This volume comprises four sections: (1) catalogs of equipment companies; (2) a directory of sources for equipment, machinery, and supplies; (3) an alphabetical listing of trade names; and (4) catalog of A.S.M.E. codes, standards, periodicals, and other publications issued by the Society.

"Midco and M-461 in a Passenger Tire GR-S Undertread Compound." Report No. 8, September 15, 1947. Midwest Rubber Reclaiming Co., East St. Louis, Ill. 4 pages. Tables and a graph of test results are presented comparing Midco and M-461 reclaims with M-68, a standard whole tire natural rubber reclaim. Both Midco and M-461 are based on blends of natural rubber and GR-S, with natural predominating, and give results comparing favorably with M-68 in undertread stocks.

"Symposium on pH Measurement." Technical Publication No. 73. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. 84 pages. Price, \$1.50. This symposium comprises seven papers and discussions presented before the A.S.T.M. meeting in Buffalo, N. Y., in June, 1946, and gives the latest theories and practices for colorimetric and potentiometric methods for making pH and closely related measurements.

"Geon Polyblend 500 X 503." Service Bulletin 47PY-1, August 15, 1947. B. F. Goodrich Chemical Co., Rose Bldg., Cleveland 15, O. 12 pages. This bulletin introduces Geon Polyblend 500 X 503 and gives detailed information on its formulation, processing, properties obtained, and applications. The material has better processing and low temperature properties than Geon Polyblend 500 X 329, which it replaces.

"Rubber Developments." Vol. 1, No. 1, September, 1947. British Rubber Development Board, Market Bldgs., Mark Lane, London E.C.3, England. 40 pages. This is the first issue of a new publication on international developments in rubber. Included are also articles on "Rehabilitation of Rubber Estates in Malaya" by Sir Eric Macfayden; "Liquid Latex Comes of Age" by Arthur Nolan; "Engineering with Rubber" by J. P. Lawrie; "Latex Processes and Potentialities" by W. H. Stevens; "Positex" by C. M. Blow; and "United States Rubber Policy" by Warren S. Lockwood.

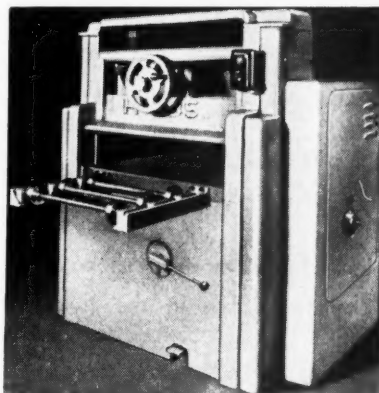
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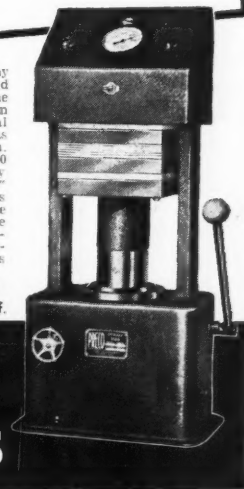
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# OTS Bibliography Reports on Rubber Products—X

The abstracts printed below are taken from the Department of Commerce's weekly publication, "Bibliography of Scientific and Industrial Reports." Copies of the complete reports, either on microfilm or as photostats, as indicated, may be obtained from the Office of the Publication Board, Department of Commerce, Washington 25, D. C.

**Manufacture of Hard Rubber Parts for Storage Batteries and Battery Ventilating Equipment for German Submarines.** S. P. Fisher. (CIOS File XXXII-81, Item 3, 12.) PB-23187, 26 pages. Photostat \$2; microfilm 50c. This report covers primarily the methods of manufacturing rubber parts for storage batteries and battery compartment ventilating equipment. Information on manufacture of rubber parts for torpedo batteries is also included. Likewise recorded is some interesting development work done on submarine jars of phenol plastic materials. Most of the hard and soft rubber parts made by Accumulator-Fabrik Aktiengesellschaft.

**Gunfire Tests of Self-Sealing Materials for Chemical Tanks.** H. O. Huss. (CWS Tech Div Memo Rpt 388.) PB-23152, April, 1942, 26 pages. Photostat \$2; microfilm 50c. Four samples of self-sealing materials were tested: three internal protection types and one external type. Results are given of tests made by firing .50 caliber armor-piercing ammunition into the materials in the form of containers for mustard gas, and the gas seepage or escape measured. Diagrams, photographs, and tables are included.

**Excerpts and Short Notes on Rubber Mixtures.** I. G. Farbenindustrie, PB-16366, 47 pages. Photostat \$4; microfilm 50c. The material consists mainly of formulae for the preparation of rubber mixtures, cements, varnishes, and coatings, mostly taken from patents or patent applications. (In German.)

**Method for the Production of Artificial Materials.** I. G. Farbenindustrie, PB-16361, November, 1932-June, 1934, 15 pages. Photostat \$1; microfilm 50c. Valuable artificial materials with rubber-like or celluloid-like properties can be obtained by polymerization of dichlorobutadiene. The latter is prepared by separation of hydrochloric acid from tetrachlorobutane. This was prepared as a patent application. (In German.)

**Method for Production of Vulcanizable Mixtures from Organic Substances Which Form Films.** I. G. Farbenindustrie, PB-16344, June, 1937-September, 1942, 23 pages. Photostat \$2; microfilm 50c. Viscous to solid, fusible polymers of an unsaturated nature are obtained as residues when butadiene or its derivatives are heated to higher temperatures with or without catalysts and pressure. If occasion arises, foreign gases or solvents or mixtures of solvents might be present. From the product of reaction the volatile constituents have to be distilled off. Mixtures of organic film-forming substances which contain about 4-15% of such polymers of butadiene or its derivatives can easily be treated on rolls and in kneaders, and they have a good absorption for carbon black. In most cases their physical properties improve after vulcanization. This was prepared as a patent application. (In German.)

**Report on Huls Chemical Works—I. G. Farben, Huls, Germany—Near Marl.** J. W. Livingston. (CIOS File XXXI-25, Item 22.) PB-23622, August, 1945, 32 pages. Photostat \$3; microfilm 50c. The Huls plant, the second largest Buna S plant in Germany, has a monthly capacity of 4,000 tons of Buna S-3 and an equivalent capacity for the butadiene, styrene, Nekal, and other intermediates required for this production. Buna S-3 is produced by continuous polymerization in a manner similar to the Schkopau and Ludwigshafen plants. Full information is given on raw materials used, manufacturing processes, and laboratory test and development work.

**Applications of Perduren G and H.** I. G. Farbenindustrie, PB-19331, August, 1937, 14 pages. Photostat \$1; microfilm 50c. Directions are given for the preparation of a Perduren G and H vulcanizable hard rubber which can be used in the production of rolls, formed bodies, and benzene and oilproof hose. (In German.)

**Vulcanization of Isoprene.** I. G. Farbenindustrie, PB-16312, 17 pages. Photostat \$1c; microfilm 50c. This is a handwritten laboratory notebook recording composition of the mixtures, emulsion polymerization, duration of tests, yields, and results of testing the physical properties. (In German.)

**Synthetic Rubber Plant, Schkopau (Near Merseburg).** R. T. Barbera. (AAF ATI Rpt P-25.) PB-18151, June, 1945, 31 pages. Photostat \$3; microfilm 50c. This is a report of a visit to one of the first plants erected for the quantity production of synthetic rubber and allied products, which achieved production capacity in 1939. The technical documents secured consist of records, experimental data, and production information.

**Method for the Production of Synthetic Materials.** I. G. Farbenindustrie, PB-16364, March, 1933-May, 1935, 41 pages. Photostat \$2; microfilm 50c. Polymerization of 1-chloro-1,3-butadiene in the absence of oxygen or in the presence of small amounts leads to extensible and elastic masses. In liquid form, as pastes or emulsions, they can be used for impregnating, coating, caulking, and cementing. In solid form, they can be used for the production of tires, conveyor belts, hose, oil-resistant caulking materials, and similar technical rubber goods. This report concerns German patent No. 698,681 and the preparation of polymers of butadiene-chloroprene. (In German.)

**Plasticizer for Chlorinated Rubber.** I. G. Farbenindustrie, PB-16363, November, 1932-May, 1935, 12 pages. Photostat \$1; microfilm 50c. Use of high molecular weight polymers of isobutylene removes the rigidity or brittleness of chlorinated rubber. The new products are in most cases resistant to water, acids, alkalis, oxygen, chlorine, sulfur dioxide, and other oxygen and sulfur containing chemicals. If necessary, fillers, pigments, resins, drying oils, etc., might be added. They can be applied as paints, coatings, varnishes, films, cements, etc. This report concerns certain German and U. S. patents. (In German.)

**German Neoprene, Vols. I-III.** M. A. Youker and N. A. Copeland. (FIAT Final Rpt 719.) PB-19857, January, 1946, 374 pages. Photostat \$25; microfilm \$4. This is the final comprehensive report on neoprene production and use in Germany. Extensive charts, tables, flow sheets, etc., are included. Production at the various plants is described from the manufacture of raw materials through the finished polymer. Discussions with German scientists on relative merits of neoprene for different applications and of the developmental processes already tested and under way are included. Applications of neoprene in different fields are discussed in detail.

**Diorthotolylguanidine or Vulkacit DOTG.** I. G. Farbenindustrie, PB-17636, November, 1939, 1 page. Photostat \$1; microfilm 50c. DOTG is used in the same way as Vulkacit D. Its special properties can be seen by a detailed table of comparison. (In German.)

**Comparison of Vulkacit AZ with Other Accelerators.** I. G. Farbenindustrie, PB-17696, October, 1937-May, 1939, 12 pages. Photostat \$1; microfilm 50c. This report consists of a set of tables showing test results of various vulcanizates. (In German.)

**Method of Producing Synthetic Rubber.** I. G. Farbenindustrie, PB-17616, August, 1942, 7 pages. Photostat \$1; microfilm 50c. This is a patent application. The claim is for the preparation of synthetic rubber by polymerizing a mixture of butadiene and the methyl ester of methacrylic acid in a neutral or acid medium at temperatures of about 25° C. Polymerization is brought about by the addition of small amounts of peracids or their salts and then the gradual addition of hydrogen peroxide. (In German.)

**Testing of Rubber.** I. G. Farbenindustrie, PB-17631, December, 1940, 1 page. Photostat \$1; microfilm 50c. This offers a description of a standard procedure to determine the elasticity of soft rubber with the help of a pendulum hammer-type Schöb.

**Method of Preparing Easily Cementable Vulcanizates of Rubber.** I. G. Farbenindustrie, PB-16359, July, 1941-December, 1942, 8 pages. Photostat \$1; microfilm 50c. This report is a patent application. The claim is for the preparation of a vulcanizate of natural or artificial rubber cementable to leather, metals and other surfaces by the addition to the vulcanization mixture of non-vulcanizable substances which have rubber-like properties and good adhesion. Some of these are polyethylene, polyisobutylene, polyvinylisobutyl ether, and polyacrylic acid esters and their mixed polymers.

**Oxide Wax.** I. G. Farbenindustrie, PB-17637, March, 1938, 1 page. Photostat \$1; microfilm 50c. Oxide wax, a bright yellow material with a softening point of about 40-50° C., facilitates the treatment of high-grade rubber mixtures in sprayers and calenders. It acts as an accelerator.

**Preparation of Isoprene in the "Merling" Apparatus O 106.** I. G. Farbenindustrie, PB-17632, 22 pages. Photostat \$2; microfilm 50c. Detailed description of a laboratory preparation of isoprene is given which is divided into two phases: the preparation of an A-product, and its reduction into a B-product. Starting materials for the A-product are ether, sodium amide, and acetylene. Decomposition is effected by glacial acetic acid. After removal of the ether, the raw A-product is submitted to fractional distillation. To obtain B, coppered zinc dust is used. Diagrams, graphs, and flow sheets are attached. (In German.)

**Examination of Diaphragm and Gasket from Japanese Aircraft Fuel Pump.** R. G. Chollar and others. (OSRD Rpt 4130.) PB-22536, September, 1944, 7 pages. Photostat \$1; microfilm 50c. The diaphragm and gasket consisted of a nylon or similar polyamide fabric coated, but not deeply impregnated with a synthetic rubber similar to Buna N. The rubber has excellent adhesion to the fabric and is superior to neoprene in resistance to swelling and tenderizing in contact with aircraft fuels. This is the first reported use of the nylon-type polymer by the Japanese.

**German General Rubber Goods Industry.** S. A. Brazier and others. (BIOS Final Rpt 349, Item 22.) PB-23658, October, 1945, 262 pages. Photostat \$18; microfilm \$3. Information was gathered from 17 plants. Data are presented on the manufacture of rubber conveyor and transmission belting, latex, ebonite, footwear, hose, plastics, soles and heels, sponge, surgical products, thread, and tires. The processes involved in the treatment of rayon, reclaiming, mill procedure, and rubber to metal bonding are described. Illustrations, graphs, and tables are included together with glossaries of compounds and compounding ingredients.

**Antioxidant 4010.** I. G. Farbenindustrie, PB-17649, March, 1938, 9 pages. Photostat \$1; microfilm 50c. This antioxidant was especially developed for the protection of tires, conveyor belts, and certain cable jackets against fatigue cracks. It does not provide protection against sun-checking, but may be mixed with paraffin and Ozokerite. Antioxidant 4010 is claimed to be superior to all other antioxidants, including American products based on phenyl-beta-naphthylamine and diphenyl-p-phenylenediamine. The antioxidant replaces in whole or in part the use of phenyl-alpha-naphthylamine and phenyl-beta-naphthylamine. Tables give test results. (In German.)

**Rayon Cord Tire Carcasses.** U. S. Ordnance Department, Detroit, Development Division, PB-19850, November, 1945, 29 pages. Photostat \$2; microfilm 50c. Tests were conducted to determine the quality of rayon cord, as compared with cotton cord, and to determine the serviceability of the new 2300 denier, two-ply rayon cord. It was concluded that standard 1109 denier, two-ply rayon tire cord improves the serviceability of synthetic military tires by increasing bruise resistance and reducing heat failures. Rayon cord is necessary in larger synthetic military tires, size 8.25-29, 16-ply and larger. Rayon cord is desirable in medium-size synthetic military tires, but is not needed in smaller tires. Heavy-gauge, 2300 denier, two-ply rayon cord, using reduced number of plies, is equal to light-gauge 1109 denier, two-ply rayon cord. Appendices contain correspondence and numerous test sheets.

(To be continued)

# Market Reviews

## CRUDE RUBBER

### Commodity Exchange

#### WEEK-END CLOSING PRICES

	Aug. 30	Sept. 27	Oct. 4	Oct. 11	Oct. 18	Oct. 25
1947						
Oct. ....	15.30	17.00	18.55	18.75	19.65	22.00
Nov. ....	15.15	16.80	18.05	18.50	19.40	21.00
Dec. ....	15.05	16.55	17.57	18.25	19.15	19.35
1948						
Jan. ....	15.05	16.45	17.30	18.00	18.95	19.00
Feb. ....	15.05	16.45	17.30	17.80	18.75	18.70
Mar. ....	15.05	16.35	17.20	17.67	18.63	18.45
Apr. ....	15.00	16.30	17.15	17.60	18.50	18.35
May ....	15.00	16.25	17.15	17.57	18.37	18.20
June ....	15.00	16.25	17.05	17.45	18.25	18.00
July ....	15.00	16.25	16.95	17.40	18.25	17.80
Aug. ....	15.00	16.25	16.95	17.40	18.25	17.75
Sept. Dec. ....	15.00	16.25	16.95	17.40	18.25	17.70

THE crude rubber futures market on the Commodity Exchange was quite lively during October. The market was featured by a steady if somewhat irregular, advance in prices and the highest volume of contracts since rubber futures trading was resumed. Factors contributing to the price advances included extensive dealer buying, tightening supplies on the physical market, and the prospects for heavy government buying after the turn of the year. December futures continued in great demand, opening the month at 17.53¢ per pound and rising to the peak of 20.30¢ on October 20. Reductions in prices for farther deliveries took place toward the end of the month as a reaction to the steady advance previously noted. Contracts placed on the Exchange during October called for 28,150 tons, as compared with 18,660 tons during September.

Supplies of crude rubber in the Far East were reported to be dwindling rapidly. Russia is said to have taken 20,000 tons recently, and unconfirmed reports state that European estates have already sold about one-half of their anticipated supplies for the first half of 1948.

In the domestic market the important developments last month were the rise in the spot price of rubber to 22¢ a pound and the quiet reentrance of the major rubber companies into the market, as reflected by the volume of contracts and tonnages sold. The government has embarked on a program of stockpiling natural rubber. How much rubber will be thus accumulated is as yet unknown, but reports are that more than 250,000 tons will be purchased toward the stockpile goal of 500,000 tons. Recent government buying has been done by the Treasury Department through its procurement division. The Treasury is expected to take over the rubber owned by the RFC and add that, or as much as is suitable, to its stockpile. Much of the RFC rubber is believed to be inferior grades and may be traded for better grades of rubber.

### New York Outside Market

THE crude rubber spot market was steady during October as prices advanced because of increased demand, the tightening supply picture for spot and nearby deliveries, and the prospects for extensive

purchasing by the government. The major rubber factories entered the market seeking to cover requirements for a 60-day production period, but were confronted by the growing scarcity of spot goods, a scarcity not expected to ease for the rest of the year. The higher prices and tightness of spot supplies have resulted in a marked increase in demand for synthetic rubber. As stated under the futures market review, reports from the Far East indicate a continuing tight supply of crude rubber; consequently no major spot price reductions can be foreseen for the next few months, at least.

The spot price for No. 1 ribbed smoked sheets started the month at 18¢ a pound and rose irregularly to 18.50¢, the government price for GR-S on October 8. This price line was crossed on October 10, when 18.88¢ was bid, and spot prices rose to 20¢ on October 17, 21.50¢ on October 22, and reached 22¢ on October 24. Some reaction in nearby deliveries was then felt, but spot prices held firm because of the tight supply situation. End-of-the-month price for No. 1 R.S.S. was 23¢.

#### WEEK-END CLOSING PRICES

	Aug. 30	Sept. 27	Oct. 4	Oct. 11	Oct. 18	Oct. 25
No. 1 Ribbed Smoked Sheets:						
Oct. ....	14.88	17.25	18.25	18.88	20.00	22.00
Nov. ....	14.88	16.88	18.00	18.63	19.75	20.00
Dec. ....	14.88	16.88	18.00	18.38	19.25	19.63
Jan.-Mar. ....	14.88	16.88	18.00	18.38	19.25	19.63
No. 3 Ribbed Smoked Sheets:						
Oct. ....	14.63	16.75	17.63	18.38	19.38	19.00
No. 2 Brown	13.63	13.50	14.00	14.50	16.00	17.00
Flat Bark	11.00	11.63	12.00	12.50	14.00	14.38

### Fixed Government Prices\*

Guayule  
Guayule (carload lots) .....\$01.7½

Latex  
Normal (tank car lots) .....30¾  
Centrifuged (tank car lots) .....32½

#### Plantation Grades

No. 1X Rubber Smoked Sheets	23
1X Thick Pale Latex Crepe	29
1 Thick Pale Latex Crepe	29
2 Thick Pale Latex Crepe	28½
3 Thick Pale Latex Crepe	28¼
1X Thin Pale Latex Crepe	29
1 Thin Pale Latex Crepe	29
2 Thin Pale Latex Crepe	28½
3 Thin Pale Latex Crepe	28¼
Liberian A	28½
AA	29
RCMA Watermarked Crepe No. 16	37½
17	32¾
18	30¾
Sole Crepe Trimmings	28½
No. 1X Thin Pale Latex Crepe Trimmings	28½
1X Brown Crepe	21½
2X Brown Crepe	21½
2 Remilled Blankets (Amber)	21¼
3 Remilled Blankets (Amber)	21½
Roller Brown	18½

#### Synthetic Rubber

GR-M (Neoprene GN)	27½
GR-S (Buna S)	18½
GR-I (Butyl)	18½

#### Wild Rubber

Upriver Coarse (crude)	12½
(Washed and dried)	20¼
Islands Fine (crude)	14½
(Washed and dried)	22½
Cauchó Ball (crude)	11½
(Washed and dried)	19½
Mangabiera (crude)	08½
(Washed and dried)	18

\* For a complete list of all grades of rubbers see Rubber Reserve Co. General Sales and Distribution Circular, July 1, 1945, as amended.

## SCRAP RUBBER

CHANGES were lacking during October in the scrap rubber market, which remained virtually at a standstill. Activity continued to be confined to the spotty movement of scrap in extremely small quantities.

Except for a further reduction in price of black passenger tubes from 4¢ per pound to 3.75¢, no price developments occurred. Most quotations in the scrap market are purely nominal since there is not enough trading to permit any definite standard of price values.

Reclaiming mills seem to be continuing to work down their reserves, but apparently have sufficient stock on hand to keep working without buying additional tonnages of scrap.

The export picture remains gloomy, as trade factors reported dwindling shipments. Even those foreign buyers willing to enter into transactions find themselves limited by a lack of dollar credits and by import restrictions.

Following are dealers' buying prices for scrap rubber in carload lots, delivered points indicated:

	Eastern Points (Net per Ton)	Akron, O. (Net per Ton)
Mixed auto tires	\$10.00	\$12.00
Truck and bus tires	nom.	nom.
Beadless tires	nom.	nom.
S.A.G. passenger (natural)	13.50	13.50
(Synthetic)	nom.	nom.
Truck (natural)	12.50	12.50
(Synthetic)	nom.	nom.
No. 1 peellings (natural)	42.50	42.50
(Synthetic)	nom.	nom.
(Recap.)	nom.	nom.
No. 2 peellings (natural)	27.50	27.50
(Synthetic)	nom.	nom.
(Recap.)	nom.	nom.
No. 3 peellings (natural)	25.00	25.00
(Synthetic)	nom.	nom.
(¢ per Lb.)		
Mixed auto tubes	nom.	3.0
Red passenger tubes	nom.	3.75
Black passenger tubes	3.75	3.75
Truck tubes	3.75	3.75
Mixed puncture-proof tubes	nom.	nom.
Air brake hose	nom.	nom.
Rubber boots and shoes	nom.	nom.

## RECLAIMED RUBBER

THE reclaimed rubber market showed no new major developments last month. The steady reduction in demand for reclaim which made itself felt during the preceding few months appeared to have ended, and there were some indications that sales during October would be at a higher level than in September. Production of reclaim continues at a good pace, and stocks of scrap rubber on hand at reclaiming mills appear sufficient for at least a few months.

Final July and preliminary August statistics on the reclaim industry are now available. Production of reclaim during July totaled 21,252 long tons; consumption, 20,433 long tons; 1,052 long tons were exported, and stocks on hand at the end of the month were 39,704 long tons. Preliminary figures for August show a production of 21,484 long tons; consumption, 20,918 long tons; exports, 1,414 long tons; and end-of-month stocks, 40,310 long tons.

No changes were made in reclaimed rubber prices during October.

## Reclaimed Rubber Prices

	Sp. Gr.	¢ per Lb.
Whole tire	1.18-1.20	8 / 8.5
Peel	1.18-1.20	9 / 9.5
Inner tube		
Black	1.20-1.22	12.75/13.25
Red	1.20-1.22	13.5 / 14
GR-S	1.18-1.20	9.5 / 10
Butyl	1.16-1.18	8.5 / 9
Shoe	1.50-1.52	8.25/ 8.75

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

## COTTON AND FABRICS

NEW YORK COTTON EXCHANGE WEEK-END CLOSING PRICES						
Futures	Aug.	Sept.	Oct.	Oct.	Oct.	Oct.
	30	27	4	11	18	25
Dec. 1948	31.30	30.75	30.86	31.37	32.22	32.79
Feb.	31.20	30.81	30.95	31.49	32.37	32.89
Apr.	31.00	30.73	30.96	31.60	32.42	32.96
June	30.47	30.44	30.67	31.27	32.05	32.47
Aug.	29.40	29.75	29.91	30.39	31.05	31.22
Oct.	27.95	28.76	28.86	29.10	29.75	29.60

THE cotton market was lively during October as prices moved upward on the basis of strong mill demand and increased speculative activity. Impetus to the advance was given by the third government crop estimate, made on October 8, which predicted a crop of only 11,508,000 bales, well below trade expectations, and brought many mills into the market to cover their low inventories. The 15/16-inch middling spot price started at 31.30¢ on October 1 and moved steadily up to a peak of 33.91¢ on October 23. The market broke sharply on October 24 with the news that Congress would be called into special session, then recovered somewhat, and closed the month at 33.05¢ on October 31. Market observers believe that Congress will impose controls over margins in the various commodity exchanges. The imposition of controls over cotton at the mill level was also seen as a distinct possibility. Future prices followed the trend of the spot market. January futures were 30.94¢ on October 1, rose to the peak of 33.43¢ on October 23, and closed at 32.45¢ on October 31.

The world's 1947-48 cotton production was estimated at 26,100,000 bales (of 500 pounds gross) by the United States Department of Agriculture on October 28. This figure is 21% more than the preceding year's exceptionally small crop of 21,500,000 bales. The New York Cotton Exchange Trade Report Service stated that stocks in the United States were approximately 12,026,000 bales, as compared to 13,412,000 bales in 1946. An end-season stock of 2,750,000 is expected.

On October 19 the Krug Committee on the State of Our National Resources reported that year-end stocks of raw cotton are expected to be at a "minimum working level," 1,000,000 bales lower than on January 1, 1947. The report also stated that tire cords were "not expected to be a problem." By the beginning of 1948 the textile industry "should be able to meet any foreseeable demand made on it" with regard to tire cords.

## Fabrics

The cotton fabric market during Octo-

ber showed a high level of activity. A great advance in number of sales of wide and heavy industrial gray goods took place, headed mainly by large contracts for chafer fabric. Business in ducks was good, with selling conducted for both year-end delivery and into the first quarter of 1948. The coated fabric trade covered fairly extensively into the first quarter on satens; while wide drills and twills sold briskly for late fourth-quarter delivery. Demand for belting ducks was strong, with sales made mostly for November, December, and January.

In the case of chafer fabrics, the close buying schedules practiced by the tire companies resulted in inventories so low that a large demand for nearby chafer fabrics developed quite suddenly. Adding to the tight market was the fact that many mills had switched looms to other fabrics, but now must change back to chafers.

A shortage of many lines of wide industrial goods in the first quarter of 1948 was freely predicted by market observers. Types of goods in which a squeeze is expected to develop include the wide satens, broken twills, drills, and chafer fabrics. In addition, mills issued warnings of impending price advances on many goods because of increased labor costs and the high raw cotton prices. The sharp demand for these goods is also making itself felt. The buying of chafer fabrics has taken place right through January, whereas such sales would not normally take place until the end of November. The same situation holds good for the other industrial fabrics in question, with some sales being made through the end of March.

## RAYON

TOTAL domestic rayon shipments during September amounted to 80,500,000 pounds, 1% under the August figure.

but 18% above that of September, 1946. Domestic rayon deliveries for the first nine months of 1947 totaled 695,000,000 pounds, 11% above the 1946 period.

September filament yarn shipments reached 60,100,000 pounds, of which 41,200,000 pounds were viscose and cupra and 18,900,000 pounds were of acetate. Deliveries of rayon staple totaled 20,400,000 pounds, of which 15,100,000 pounds were viscose and 5,300,000, acetate.

For the first nine months this year, domestic filament yarn shipments were 538,000,000 pounds, consisting of 380,900,000 pounds of viscose and cupra and 157,100,000 pounds of acetate. Staple shipments in the same period totaled 157,000,000 pounds, of which 115,900,000 pounds were viscose, and 41,100,000 acetate.

Rayon stocks held by producers at the end of September totaled 14,400,000 pounds, an increase over August stocks. Of this total, 5,600,000 pounds were viscose and cupra yarn; 2,400,000 pounds were acetate yarn, and 6,400,000, staple and tow.

## Foreign Trade Opportunities

The firms and individuals listed below have recently expressed their interest in buying in the United States or in United States representations. Additional information concerning each import or export opportunity, including a World Trade Directory Report, is available to qualified United States firms and may be obtained upon inquiry from the Commercial Intelligence Unit of the United States Department of Commerce, or through its field offices, for \$1 each. Interested United States companies should correspond directly with the concerns listed concerning any projected business arrangements.

## Export Opportunities

G. Mak, 62 Singel, Amsterdam, Holland: pure rubber belting, V-ropes.  
E. J. Hunt & Co., P. O. Box 376, Fischers' Bldg., Port Elizabeth, Union of South Africa: synthetic material for covering suitcases.  
A. S. Moss and W. Webb, representing Greengate & Irwell Rubber Co., Ltd., Salford 3, Lancashire, England: vulcanizing machinery.

## Estimated Automotive Pneumatic Casings and Tube Shipments, Production, and Inventory—August and July, 1947—First Eight Months, 1947; 1946

1947					
	August	% of Change from Preceding Month	July	First Eight Months	1946, First Eight Months
PASSENGER CASINGS					
Shipments					
Original equipment	1,413,914		1,507,442	12,606,398	5,892,306
Replacement	4,638,361		4,481,085	34,932,953	34,911,927
Export	122,381		123,037	1,089,252	378,447
TOTAL	6,174,656	+ 1.03	6,111,564	48,628,603	41,182,680
Production	5,820,172	+ 6.31	5,474,573	50,924,858	41,657,045
Inventory end of month	3,904,743	— 8.85	4,283,995	3,904,743	2,288,409
TRUCK AND BUS CASINGS					
Shipments					
Original equipment	378,803		466,673	3,707,565	2,412,532
Replacement	812,798		749,845	6,363,863	7,199,690
Export	276,373		112,559	1,113,098	530,641
TOTAL	1,345,593	+ 1.24	1,329,077	11,183,526	10,142,863
Production	1,344,558	+ 2.23	1,315,208	12,050,240	10,104,433
Inventory end of month	1,559,531	+ .34	1,554,193	1,559,531	718,031
TOTAL AUTOMOTIVE CASINGS					
Shipments					
Original equipment	1,792,717		1,974,115	16,313,963	8,304,838
Replacement	5,451,159		5,230,930	41,295,816	42,111,617
Export	276,373		235,596	2,202,350	909,088
TOTAL	7,520,249	+ 1.07	7,440,641	59,812,129	51,325,543
Production	7,164,730	+ 5.52	6,789,781	62,975,098	51,761,478
Inventory end of month	5,464,274	— 6.41	5,838,188	5,464,274	3,006,440
PASSENGER AND TRUCK AND BUS TUBES					
Shipments					
Original equipment	1,792,424		1,969,501	16,305,406	8,302,970
Replacement	4,509,409		4,050,719	31,560,929	36,658,229
Export	197,115		196,028	1,918,300	854,251
TOTAL	6,498,948	+ 4.55	6,216,248	49,784,635	45,815,450
Production	5,179,052	+14.02	4,542,333	52,488,240	46,833,552
Inventory end of month	6,937,030	—12.30	7,909,415	6,937,030	3,928,912

NOTE: Cumulative data on this report includes adjustments made in prior months.  
SOURCE: The Rubber Manufacturers Association, Inc.

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4", 5", 6", 8", 10", 12" diameters, any length.  
Besides our well known Standard and Heavy Duty Constructions,  
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## Regular and Special Constructions of COTTON FABRICS

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## Curran & Barry

320 BROADWAY

NEW YORK

## Malayan Rubber Statistics

The following statistics for August, 1947, have been received from Singapore by way of Malaya House, 57 Trafalgar Square, London, W.C.2, England.

### Ocean Shipments from Singapore and Malayan Union—in Tons

To	Sheet and Crepe			Latex, Concentrated Latex, and Revertex (Dry Rubber Content)		
	Singapore Export Proper	Malayan Union Transshipped Shipments	Direct Shipments	Singapore Export Proper	Malayan Union Transshipped Shipments	Direct Shipments
Argentina Republic	88	23	..	55	..	..
Australia	2,625	228	932	5	19	..
Belgium	281	54	702	32	..	..
British India	50	50	275	..	..	..
Burma	1	..	..	..	..	..
Canada	918	5	620	..	..	..
Chile	..	..	200	..	..	..
China	..	..	20	..	..	..
Czechoslovakia	100	12	275	20	..	17
Denmark	110	11	52	..	..	..
Egypt	11	..	5	..	..	..
Eire	..	1	..	..	..	..
Finland	..	..	600	..	..	..
France	834	356	807	101	102	..
Germany	482	115	2,597	..	..	39
Greece	100	..	5	1	..	..
Hong Kong	2,233	70	120	..	..	..
Iran	10	..	..	..	..	..
Italy	280	39	742	7	25	..
Japan	1,005	35	240	51	..	..
Mexico	650	..	100	..	..	..
Morocco	..	..	352	..	..	..
Netherlands	150	20	144	15	..	..
New Zealand	85	73	5	2	7	..
Norway	80	20	105	..	..	..
Other countries in South America	25	12	..	..	..	..
Palestine	..	..	17	..	..	..
Portugal	42	..	15	..	..	..
Sweden	240	..	90	..	..	..
Switzerland	67	1	2	..	..	..
Syria	11	..	2	..	..	..
Turkey	79	..	109	..	..	..
Union of South Africa	774	301	..	5	..	..
United Kingdom	4,285	1,660	5,019	918	2	35
U. S. A.	16,856	2,636	16,347	888	..	729
<b>TOTAL</b>	<b>42,934</b>	<b>5,642</b>	<b>30,808</b>	<b>2,096</b>	<b>155</b>	<b>820</b>

### Foreign Imports of Rubber in Long Tons

	Dry Rubber	Wet Rubber (Dry Weight)
<b>Singapore Imports from</b>		
Bangka and Billiton	10	..
British Borneo	717	12
Brunei	151	3
Dutch Borneo	527	11
French Indo-China	20	57
Other Dutch Islands	56	..
Rio Residency	400	27
Sarawak	2,272	13
Siam	960	..
Sumatra	9,100	1,888
<b>TOTAL</b>	<b>14,222</b>	<b>2,011</b>
<b>Malayan Union Imports from</b>		
Burma	11	1
Siam	734	6
Sumatra	1,528	832
<b>TOTAL</b>	<b>2,273</b>	<b>840</b>

### Dealers' Stocks

	Tons
Singapore	54,722
Penang & Province Wellesley	17,955
<b>TOTAL</b>	<b>72,678</b>

### Port Stocks in Private Lighters and Railway Godowns

Penang & Province Wellesley	4.48
Port Dickson	25
Port Swettenham	1,028
Singapore	10,061
Teluk Anson	484
<b>TOTAL</b>	<b>18,080</b>

### Production

Estates	28,514
Small holdings	20,537
<b>TOTAL</b>	<b>49,051</b>

\*Estimated.

## AFRICA

The General Tire & Rubber Co. (South Africa) Ltd., has been formed with a capital of £1,000,000 in 1,200,000, 5s. A shares, 1,200,000 5s. B shares, and 400,000 5½% £1 preference shares. Of the A shares issued at par, 200,000 have been taken by the firm of Williams, Hunt, and another 200,000 has been taken by The General Tire & Rubber Co., Akron, O. The new company has acquired 35 acres in Young Industrial Township, Port Elizabeth, where a tire factory is to be built. Machinery and other equipment is being sent from America.

The establishment of large tire factories has enabled South Africa gradually to free herself from the necessity of importing tires. In 1939 more than 3,500,000 pounds of tires and tubes, value £325,000, were imported, and in 1941, more than 5,800,000 pounds value £576,000, but by 1944, imports of these goods were only 577,000 pounds, value £31,800.

Besides the large tire plants several smaller factories operate here. In 1942-43 the rubber factories totaled 70, employing 3,498 persons. In September 1946, the number of employees had risen to 4,330. Consumption of rubber in 1946 is put at 12,500 tons of natural rubber and 2,750 tons of synthetic rubber.

South Africa has been exporting tires for several years now; in 1939, the total was 533,000 pounds, value, £61,641; in 1943 the record total was reached of 26,071,118 pounds, value, £2,845,049. There was a recession in 1944 to 15,676,873 pounds, value, £2,068,625.

## MEXICO

By all accounts, 1946 was a banner year for Mexican tire manufacturers; their total production of automobile and truck tires for the year was estimated at 465,000 units. With domestic demand still unsatisfied despite this activity and with an easier

raw material situation, it is expected that 1947 output will be even larger, and estimates for the current year go as high as 750,000 units. One firm is also said to be contemplating the production of airplane tires—if demand warrants the step.

Reports from Mexico indicate considerable progress there in the production of coated fabrics, to the extent that this republic expects to be able to meet domestic demands for coated fabrics this year and to have a surplus available for export. Chief demand in this country is for pyroxylin-coated fabrics, imports of which totaled 362,695 pounds (equal to about 250,000 yards of 54-inch material) in 1946 and constituted 90% of the total quantity of coated fabrics entering in that year. In 1946 production of this type of goods increased twofold, and it is expected that a recently opened plant in Mexico City will permit the filling of all home demands except for special patterns and colors, which may still have to be imported. In addition, a new firm is putting out polyvinyl-chloride-coated fabrics.

Various other synthetic resin coatings are being tried out here. Polyvinyl butyral resins seem to have a prospective market of more than 10,000 pounds a month.

## JAPAN

For the first half of 1947 crude rubber imports into Japan are reported at about 10,000 tons. As from July, it became possible for Japan to receive regular crude rubber shipments from Malaya and Netherlands India in the amount of 1,890 tons monthly. The rubber is to be used for essential domestic needs and for goods for export. Limited shipments of rubber goods are reportedly now being made to Singapore, Hong Kong, India, China, Korea, and also to the United States and Belgium. It is further learned that the government plans to increase tire production to reach 5,500 tons quarterly, and to this end tire prices are to be revised, loans made to tire manufacturers, and reclaiming factories improved.

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### SITUATIONS WANTED

**SINGLE MAN—9 YEARS IN TEXTILE LABORATORY CONTROL** and research in conjunction with development work on mechanical and air rubber products. Also pattern maker on rubber boats, etc., and rubber laboratory tester. Address Box No. 958, care of INDIA RUBBER WORLD.

**CHEMIST, FACTORY MANAGER: 40; 17 YEARS' EXPERIENCE** in the compounding, development, testing, and manufacture of mechanical rubber goods products. Experienced in hose, packings, belting, and molded parts. Desires position with small or medium sized progressive manufacturer. Address Box No. 959, care of INDIA RUBBER WORLD.

**RUBBER CHEMIST, YEARS OF EXPERIENCE IN PRODUCTION**, research development on mechanicals, cables, footwear, sponge. Desires permanent position. At present Factory Superintendent of small eastern plant. Address Box No. 960, care of INDIA RUBBER WORLD.

**RUBBER CHEMIST AND TECHNOLOGIST; CHIEF CHEMIST OR** laboratory director. Experience includes tires, tubes, and various mechanical goods. Desires position with progressive rubber company. Location immaterial. College graduate. Excellent references. Address Box No. 961, care of INDIA RUBBER WORLD.

**CHEMICAL ENGINEER, AGE 27, FOUR YEARS' EXTENSIVE** experience in product development, research of water dispersions and solvent solutions of synthetic, natural, reclaimed rubbers, vinyl polymers for adhesives, coatings, saturants, binders; dipped goods; sales service work. Desires responsible position. Address Box No. 962, care of INDIA RUBBER WORLD.

**CHEMIST, B.S., PROVEN PRACTICAL BACKGROUND IN** pressure-sensitive adhesives on paper, cloth, film, metal. Skilled formulator in industrial cements, lacquers, laminants, from plastic polymers, natural and synthetic rubbers. Helpful, cooperative with management and associates. 12 years' specialization. Salary \$360 per month. Address Box No. 963, care of INDIA RUBBER WORLD.

**PLANT OR DEPARTMENT SUPERVISOR WITH A TECHNICAL** training and many years of practical experience in the rubber and plastic industry. A well-rounded knowledge of compounding, milling, mixing on the open mill or Banbury, calendaring, spreading, extruding, and molding, including fabric proofing in both single and double coatings of many lines. A sufficient mechanical and engineering ability to aid in the maintenance of plant efficiency. Address Box No. 964, care of INDIA RUBBER WORLD.

**CALENDER ROOM SUPERINTENDENT WITH 20 YEARS' EXPERIENCE** in rubber and vinyl resins seeks position with responsible firm. Address Box No. 965, care of INDIA RUBBER WORLD.

**EXECUTIVE RUBBER CHEMIST: TWENTY YEARS' EXPERIENCE** in direction, coordination, and pursuit of research developments through production, specification, controls. Rubber compounding; latex sponged and dipped processing; bonding. Development of synthetic organic chemicals. Excellent collegiate training. Recent Technical Director available immediately. Location immaterial. Address Box No. 793, care of INDIA RUBBER WORLD.

**RUBBER CHEMIST: AGE 38, MARRIED, WITH 15 YEARS' experience** in compounding, development, and production of sponge rubber and mechanical rubber goods with some experience in thermoplastics. Desires to make connection with responsible company in like position or technical sales. Available December 1. Address Box No. 974, care of INDIA RUBBER WORLD.

**FOREMAN, TWENTY YEARS' EXPERIENCE COMPOUNDING,** mixing, calendaring, tubing in mechanical line. Address Box No. 975, care of INDIA RUBBER WORLD.

**RUBBER TECHNOLOGIST, 39, MARRIED, GRADUATE CHEMICAL** engineer. Five years' chief chemist in insulated wire and cable plant. Also some experience in drug sundries and molded goods. Desires responsible position. Address Box No. 977, care of INDIA RUBBER WORLD.

**RUBBER CHEMIST, B.S., 1942, AGE 30, FIVE YEARS' COMPOUNDING** experience mechanicals, sponge, and small tires, desires position in laboratory or technical sales work. Address Box No. 978, care of INDIA RUBBER WORLD.

### BUSINESS OPPORTUNITIES

**MECHANICAL RUBBER FACTORY ON WEST COAST, WELL** equipped and in excellent condition. Illness reason for sale. For further details Address Box No. 969, care of INDIA RUBBER WORLD.

**COMPLETE PLASTIC EXTRUSION PLANT, FOR SALE, FULLY** equipped with eight extruders including machine shop and grinding department. Industry leader international reputation. Hundreds of stock molds to make all size tubing, profiles, etc. Good will, patents, accounts. Reason for sale other interests. Excellent buy for interests seeking expansion in plastic field. Address Box No. 979, care of INDIA RUBBER WORLD.

### SITUATIONS OPEN

## WANTED: EXPERIENCED CHEMIST

for coated fabrics. We are looking for a man thoroughly familiar with compounding of vinyls-organosols-pyroxilin.

Future prospects excellent with an established Massachusetts corporation. All replies held in strict confidence.

Address Box No. 956, care of  
INDIA RUBBER WORLD

## PRACTICAL CHEMIST

Must have experience in spread coatings and impregnation, rubber and resin; emphasis on single and double texture goods, quarterlinings, etc. Degrees secondary to ability and experience. Good salary, exceptional opportunity with long established medium sized company in Metropolitan New York area. Give full details in strict confidence in first letter to:

President  
Box No. 957  
Care of INDIA RUBBER WORLD

## TIRE ENGINEER

Should have all-round experience in tire and tire mold design and related production problems. To take complete charge of tire design and construction department of medium-sized tire and mechanical goods plant located in State of Ohio. All inquiries treated strictly confidential.

Address Box No. 972, care of  
INDIA RUBBER WORLD

**MOLD ROOM FOREMAN—RUBBER PLANT IN NEW YORK** City area—small department needs thoroughly experienced and qualified leader of men on small articles. State experience, age, salary requirements, and complete information in first letter. Address Box No. 966, care of INDIA RUBBER WORLD.

## United States Imports, Exports, and Reexports of Crude and Manufactured Rubber

IN OUR July, 1947 issue, page 574, we began the regular publication of statistics on rubber production, consumption, and stocks as supplied each month by the Office of Materials Distribution, United States Department of Commerce. Most of these figures had previously been included in our "News of the Month" section since they became available soon after the end of the war. Statistics for the war years were published in our September, 1946, issue, and statistics for 1946 appeared in our March, 1947, issue, page 823.

With the continuing reduction of the controls administered by the Rubber Division, OMD, and the inability of the Rubber Division to collect statistical information as complete as heretofore, statistical information from January, 1947, on, issued by the Office of Materials Distribution and

the Bureau of Census, are both based on Bureau of Census figures. This fact was indicated in the OMD figures which appeared in our October issue on page 138.

Information from the Bureau of Census is more extensive than that reported by OMD since it covers not only imports and exports of crude rubber, but also manufactured goods. Beginning with this issue, therefore, we will present each month a summary of such information prepared from the Bureau of Census reports in addition to the OMD reports. Some duplication on crude rubber will result, but the reports from the two bureaus on this item are presented in a different manner and are therefore both useful. Eventually it is expected only one source of such statistics will be provided.

### Imports for Consumption of Crude and Manufactured Rubber

	January, 1947		February, 1947	
	Quantity	Value	Quantity	Value
<b>UNMANUFACTURED, (Lbs.)</b>				
Crude rubber .....	207,109,112	\$51,035,472	129,406,279	\$30,580,942
Rubber latex .....	.....	.....	5,434,993	1,550,499
Guayule .....	713,000	169,081	1,076,800	256,760
Balata .....	406,325	252,580	604,544	300,828
Ielutong or Pontianak .....	83,539	29,087	80,183	44,629
Gutta percha .....	80,193	71,252	38,887	39,679
Reclaimed rubber .....	.....	.....	200	40
Scrap rubber .....	978,977	25,799	1,044,523	25,046
TOTALS .....	209,373,146	\$51,583,271	137,686,409	\$35,798,423
<b>MANUFACTURED</b>				
Tires: auto, bus, and truck .....	4,404	10,494	4,718	17,279
Bicycle .....	.....	.....	300	1,694
Other .....	.....	.....	2,500	1,512
Inner tubes .....	4,364	14,512	3,879	12,016
Boots, shoes, and overshoes .....	199	360	0	23
Rubber-soled foot wear with fabric uppers .....	2,348	7,502	351,157	442,720
Heels and soles .....	12,560	2,002	.....	.....
Athletic balls: golf .....	4,800	1,334	.....	.....
Other .....	5	6	720	.....
Toys .....	.....	169	.....	.....
Hard rubber products .....	.....	1,700	.....	.....
Rubberized printing blankets .....	190	847	1,749	9,257
Rubber and cotton packing .....	1,403	1,861	2,209	3,245
Gaskets and valve packing .....	.....	739	.....	48
Belted .....	551	1,202	.....	222
Hose and tubing .....	.....	.....	.....	.....
Rubber bands .....	1	1	.....	.....
Soft rubber: druggists' sundries .....	.....	189	.....	.....
Other products .....	.....	17,618	.....	6,516
Rubber substitute products .....	75	15	8,010	1,562
TOTALS .....	50,906	\$60,453	372,238	\$496,285
GRAND TOTALS, ALL RUBBER IMPORTS ..	209,404,052	\$51,643,724	138,058,647	\$36,294,708

### Exports of Foreign Merchandise

<b>UNMANUFACTURED, (Lbs.)</b>				
Crude rubber .....	44,923	\$16,644	4,461,650	\$1,149,953
Balata .....	122,365	100,910	178,168	129,979
Chicle .....	6,600	3,960	19,016	23,331
TOTALS .....	173,888	\$121,514	4,658,834	\$1,303,194
<b>MANUFACTURED</b>				
Tire casings and tubes .....	57	\$624	40	\$1,615
Rubber and balata belting .....	5,027	4,288	83	64
Hose and tubing .....	971	3,251	372	413
Packing .....	660	273	.....	.....
Mats and flooring .....	.....	.....	400	590
Cement .....	.....	3,655	.....	1,487
Druggists' sundries .....	.....	1,577	.....	1,961
Other rubber products .....	.....	.....	.....	.....
TOTALS .....	6,715	\$13,658	895	\$6,130
GRAND TOTALS, ALL RUBBER REEXPORTS ..	180,603	\$135,172	4,659,729	\$1,309,324

### United States Motor Vehicle Factory Sales

	(Number of Vehicles)			
	Passenger Cars	Motor Trucks	Motor Coaches	Total
1946	.....	.....	.....	.....
First six months, Total ..	640,624	333,874	3,770	978,268
1947	.....	.....	.....	.....
January .....	246,605	99,818	1,273	347,696
February .....	267,015	105,042	1,303	373,360
March .....	301,525	118,234	1,421	421,180
April .....	314,765	106,984	1,659	423,399
May .....	284,357	96,430	1,853	382,640
June .....	307,124	91,810	1,628	400,562
First six months, Total ..	1,721,391	618,318	9,128	2,348,837

Source: American Automobile Manufacturers Association.

### Exports of Domestic Merchandise

	January, 1947		February, 1947	
	Quantity	Value	Quantity	Value
<b>UNMANUFACTURED, (Lbs.)</b>				
Crude rubber .....	.....	.....	10,885	\$6,616
Balata .....	33,166	\$33,166	2,711	9,082
Synthetic rubber: GR-S .....	6,807,338	1,354,928	3,905,112	728,820
Butyl .....	6,403	1,600	7,076	1,709
Neoprene .....	476,465	141,194	935,727	315,021
Nitrile .....	235,428	96,886	4,634	2,034
Thiokol .....	14,000	12,108	600	225
Polyisobutylene ..	74,340	7,225	15,167	4,777
Others .....	114,747	23,592	.....	.....
Reclaimed rubber ..	3,232,091	249,883	2,557,115	202,286
Scrap rubber .....	13,332,950	416,571	8,508,209	288,672
TOTALS .....	24,326,928	\$2,337,213	15,947,236	\$1,459,242
<b>MANUFACTURED</b>				
Cement .....	58,036	\$77,506	92,498	\$107,071
Rubberized fabric: auto cloth .....	1,958	4,104	113,328	49,175
Piece goods and hospital sheet .....	298,224	196,245	256,169	170,292
Rubber footwear: Boots .....	46,499	148,900	77,171	261,445
Shoes .....	75,203	144,294	95,848	157,606
Rubber-soled with fabric uppers .....	79,372	125,785	110,853	148,440
Soles .....	26,253	75,672	61,122	90,075
Heels .....	67,960	66,686	148,081	100,559
Soling and top lift sheets .....	146,342	35,531	458,106	99,615
Gloves and mittens .....	29,804	79,797	35,561	152,513
Druggists' sundries: Water bottles and fountain syringes ..	90,568	49,442	90,616	47,937
Other .....	.....	276,879	.....	350,090
Rubber and rubberized clothing .....	.....	333,900	.....	253,714
Balloons .....	.....	185,250	.....	167,832
Toys and balls .....	.....	53,678	.....	41,167
Bathing caps .....	13,697	52,304	6,890	34,168
Rubber bands .....	34,222	23,156	41,854	33,962
Erasers .....	56,101	51,846	72,474	65,695
Hard rubber goods: Battery boxes .....	34,000	38,903	48,794	39,879
Other electrical goods .....	197,188	74,252	71,747	36,361
Combs .....	21,357	24,252	10,238	12,173
Other .....	.....	11,514	.....	15,364
Tire casings: truck and bus .....	178,871	7,343,228	185,411	7,864,997
Auto .....	193,778	2,996,137	130,297	1,901,305
Inner tubes: auto, truck, and bus ..	297,354	1,126,423	250,320	951,896
Other casings and inner tubes .....	70,046	1,025,446	97,928	781,658
Solid tires: auto and truck .....	11,613	517,230	3,678	106,096
Other .....	34,471	19,241	7,940	4,458
Tire repair materials: Camelback .....	697,928	179,417	351,742	87,935
Other .....	612,450	316,975	845,263	334,693
Rubber and friction tape .....	148,439	68,376	120,104	69,881
Rubber belting: auto fan belts .....	131,136	153,785	204,175	227,723
Other .....	1,246,359	1,040,519	1,298,016	1,211,161
Hose and tubing: Garden hose .....	59,978	30,602	21,037	9,843
Other .....	1,126,831	702,557	1,046,763	598,155
Packing .....	187,103	121,793	207,238	140,368
Mats, flooring, and tiling .....	394,241	187,835	704,667	390,146
Rubber thread: Bare .....	123,116	173,529	123,531	168,871
Textile covered .....	15,632	29,456	10,594	31,541
Gutta percha manufactures .....	5,346	9,517	4,280	5,631
Compound latex and other rubber for further manufacture ..	198,205	114,866	314,391	129,565
Other rubber products .....	.....	252,658	.....	268,159
TOTALS .....	7,029,681	\$18,709,486	7,718,725	\$17,719,235
GRAND TOTALS, ALL RUBBER EXPORTS ..	31,356,609	\$21,046,699	23,665,961	\$19,178,477

## CLASSIFIED ADVERTISEMENTS

Continued

### SITUATIONS OPEN—(Continued)

**ENGINEER**—AGE 25 TO 40, WITH SOME MECHANICAL GOODS production and engineering experience. This is an unusual opportunity in mechanical rubber products of a highly specialized nature. Extensive experience not absolutely necessary. Address Box No. 967, care of INDIA RUBBER WORLD.

**RESPONSIBLE MAN WITH EXPERIENCE TO SUPERVISE EX-**truding department in southern Michigan rubber factory. Must be able to make own extruding dies. State age, education, experience, and salary requirements in first hand-written letter. Address Box No. 968, care of INDIA RUBBER WORLD.

**RESEARCH AND DEVELOPMENT CHEMIST NEEDED FOR** company located in southeastern New York State, engaged in manufacturing mechanical rubber goods. Give complete resume of education and experience, as well as salary desired, in initial correspondence. Address Box 976, care of INDIA RUBBER WORLD.

**WANTED: TECHNICALLY TRAINED PRODUCTION SUPER-**visor with rubber footwear or sponge experience. In reply state age, education, details of experience, and salary expected, to WELLCO SHOE CORPORATION, Waynesville, North Carolina.

### MACHINERY AND SUPPLIES WANTED

**WANTED: 6 x 12 2-ROLL MILL, SCOTT TENSILE TESTER,** hydraulic press 18 x 18 with oil pump system, testing molds and dies, low-temperature tester, Fadometer, balances, mechanically convected electric oven, lab. tables, Shore Durometer, usual lab. equipment. Address Box No. 971, care of INDIA RUBBER WORLD.

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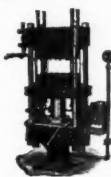
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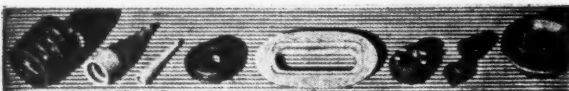
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## Dominion of Canada Statistics

### Imports of Crude and Manufactured Rubber

	August, 1947		August, 1946	
	Quantity	Value	Quantity	Value
<b>UNMANUFACTURED</b>				
Balata .....	1,842	\$ 6,934	4,751	\$ 3,318
Crude rubber .....	5,673,859	964,487	7,664,283	1,465,065
Latex .....	201,819	74,845	94,739	40,083
Rubber, powdered and waste .....	507,300	21,250	1,295,900	27,778
Recovered .....	1,695,400	126,125	1,606,200	128,467
Synthetic and substitute .....	45,600	11,179	225,000	45,725
<b>TOTALS</b> .....	<b>8,125,820</b>	<b>\$1,204,820</b>	<b>10,890,875</b>	<b>\$1,710,436</b>
<b>PARTLY MANUFACTURED</b>				
Comb blanks of hard rubber .....		\$ 2,579		\$ .....
Hard rubber in rods or tubes .....	470	782		
Rubber thread, not covered .....	5,421	7,348	6,436	8,285
<b>TOTALS</b> .....	<b>5,891</b>	<b>\$ 10,709</b>	<b>6,436</b>	<b>\$ 8,285</b>
<b>MANUFACTURED</b>				
Belting .....		\$ 47,238		\$ 28,430
Boots and shoes of rubber, n.o.p. ....	17,367	30,392	11,544	6,680
Canvas shoes with rubber soles .....	289	920		
Cement .....		54,825		33,373
Clothing of waterproofed cotton or rubber .....		6,682		1,477
Druggists' sundries .....		45,572		31,020
Gaskets and washers .....		24,673		20,916
Gloves .....	1,565	4,773	1,070	5,090
Golf balls .....	728	3,509	398	2,715
Heels .....	2,342	328	10,376	1,690
Hose .....		42,767		27,305
Hot water bottles .....		4,639		3,560
Inner tubes, n.o.p. ....	4,134	8,949	3,073	11,263
Bicycle .....	1,154	987	192	138
Liquid sealing compound .....		9,884		19,511
Mats and matting .....		55,442		24,394
Nursing nipples .....	952	3,004	847	2,604
Packing .....		8,331		19,426
Raincoats .....	382	915	4	95
Tires pneumatic, n.o.p. ....	15,537	205,743	7,907	204,461
Bicycle .....	1,161	1,736	1,110	804
Solid for automobiles and motor trucks .....		373		
Other .....		8,698		2,951
Tire repair material .....		21,236		27,523
Other rubber manufactures .....		319,561		226,090
<b>TOTALS</b> .....		<b>\$ 908,169</b>		<b>\$ 698,912</b>
<b>TOTAL RUBBER IMPORTS</b> .....		<b>\$2,123,698</b>		<b>\$2,417,633</b>

### Exports of Crude and Manufactured Rubber

<b>UNMANUFACTURED</b>				
Crude rubber .....	5,808,908	\$1,121,256	5,701,868	\$1,075,758
Waste rubber .....	744,100	9,439	1,013,000	22,270
<b>TOTALS</b> .....	<b>6,553,008</b>	<b>\$1,130,695</b>	<b>6,714,868</b>	<b>\$1,098,028</b>
<b>PARTLY MANUFACTURED</b>				
Soling slabs of rubber .....	150	\$ 36	17,957	\$ 2,643
<b>MANUFACTURED</b>				
Bathing caps .....		\$ .....		\$ 217
Belting, n.o.p. ....	323,523	214,614	112,674	69,301
Belts, fan .....		1,900		769
Boots and shoes of rubber, n.o.p. ....	427,498	641,940	201,147	318,740
Canvas shoes with rubber soles .....	314,170	324,974	139,404	128,885
Clothing of rubber and waterproofed clothing ..		23,834		58,690
Heels .....	40,860	3,332	27,810	2,584
Hose .....		68,310		32,790
Inner tubes for motor vehicles .....	36,532	105,017	4,793	13,380
Soles .....	798	269	61,727	8,837
Tires, pneumatic for motor vehicles .....	34,432	625,840	3,123	70,491
Other .....	1,575	1,302	7,459	7,403
Wire and cable, copper, insulated .....		215,522		113,535
Other rubber manufactures .....		54,660		52,219
<b>TOTALS</b> .....		<b>\$2,281,541</b>		<b>\$877,241</b>
<b>TOTAL RUBBER EXPORTS</b> .....		<b>\$3,412,272</b>		<b>\$1,977,912</b>

"The Story of Polymer." Polymer Corp., Sarnia, Ont., Canada. 38 pages. This illustrated booklet describes the development and current status of Polymer. Individual sections are devoted to Polymer today; research; chemicals and plastics; plastic products; the plant and its men; GR-S; GR-S products; Butyl; and a table of comparative properties of vulcanized GR-S, Butyl, and natural rubbers.



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## CLASSIFIED ADVERTISEMENTS

Continued

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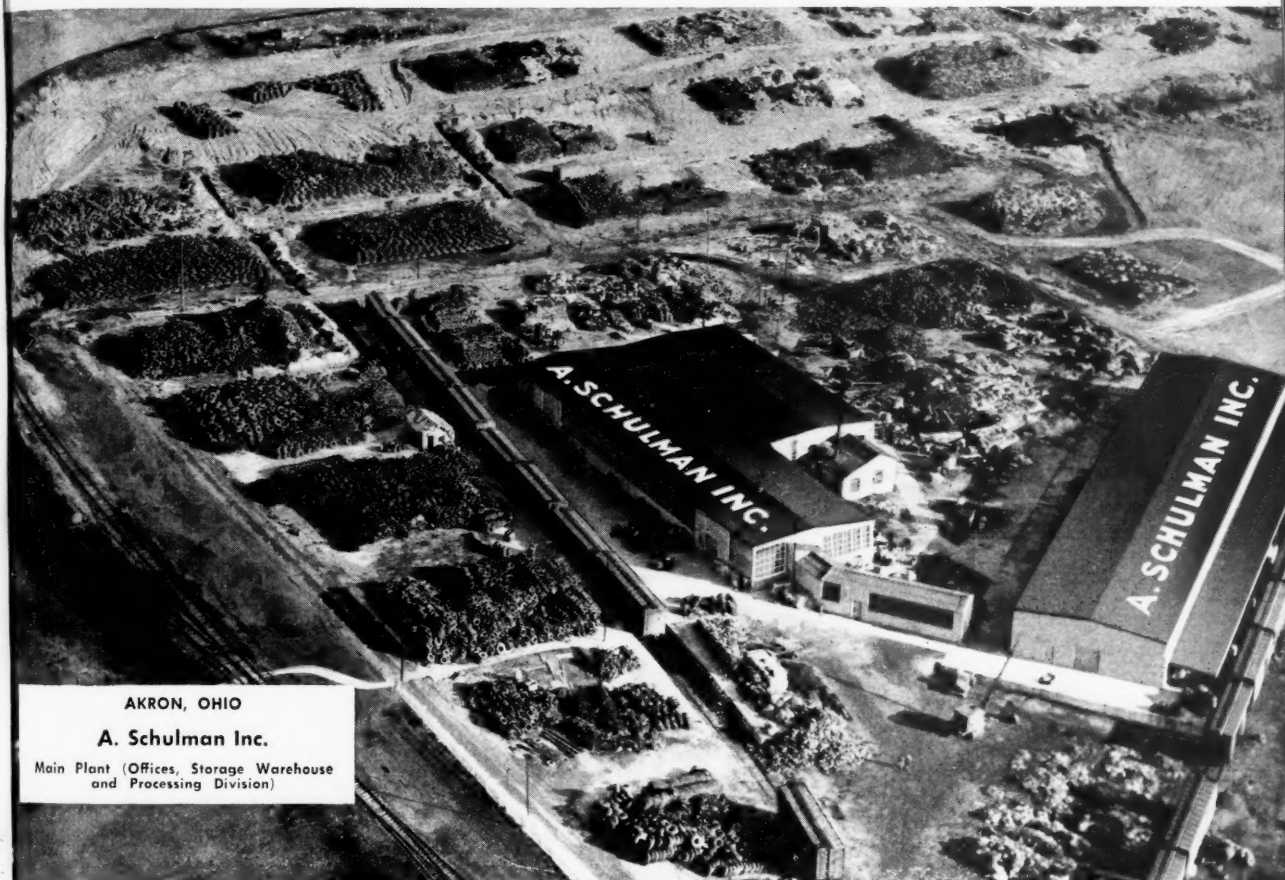
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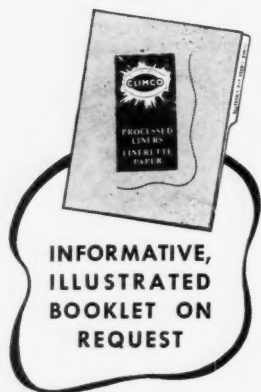


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